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Mottaleb, Ayman M.

Monterey, CA; Naval Postgraduate School

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# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

## **THESIS**

**COMMUNITY OF PRACTICE MODEL TO ENHANCE  
U.S. NAVY FULL-TIME SUPPORT INFORMATION  
TECHNOLOGY TRACK PERFORMANCE**

by

Ayman M. Mottaleb

June 2021

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Richard D. Bergin IV

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**COMMUNITY OF PRACTICE MODEL TO ENHANCE U.S. NAVY FULL-TIME  
SUPPORT INFORMATION TECHNOLOGY TRACK PERFORMANCE**

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Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE IN NETWORK OPERATIONS AND TECHNOLOGY**

from the

**NAVAL POSTGRADUATE SCHOOL  
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## **ABSTRACT**

In this case study, the researcher investigates applying the community of practice (CoP) principles to the U.S. Navy Full-Time Support officers' community serving in the IT Track (FTS-IT). This study shows how implementing CoP will improve the collaboration, training, and development of the members of the FTS-IT. This study follows a strict qualitative approach; therefore, the data collected were based on the theoretical foundations of the CoP and interviews. The participants were selected using purposive sampling methodology from a group of experts in IT and talent management. The purposive sampling methodology used in this study is non-random, and the selection of participants depends on the quality of knowledge they would provide to enrich the research depth and breadth. The interviews were in the form of open-ended questions and directed in a conversational style. The CoP model suggested in this study should not be regarded as a mere outcome; it is recommended to serve as the FTS-IT community's means to help its members develop, train, mentor, and network. Furthermore, the proposed CoP model is supported by virtual platforms and technologies to ensure capturing, storing, and transferring knowledge among the FTS-IT members.



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## **LIST OF ACRONYMS AND ABBREVIATIONS**

1207-IT	FTS-HR Officers whose primary functions are managing IT in NAVRESFORCOM (this is not an official term)
BUMED	Bureau of Medicine and Surgery, U.S. Navy
CISSP	Certified Information Systems Security Professional
CNO	Chief of Naval Operations
CoP	community of practice
CNR	Chief of Navy Reserve
CNRC	Commander Navy Reserve Force Command
CNRFC	Commander Navy Reserve Forces Command
DOD	Department of Defense
DODCIO	Department of Defense Chief Information Officer
DON	Department of the Navy
DONCIO	Department of the Navy Chief Information Officer
DoDI	Department of Defense Instruction
DON	Department of the Navy
FTS	Full-Time Support
FTS-IT	Navy Reserve IT (this acronym is unique to this thesis)
GIAC	Global Information Assurance Certification
GSLC	GIAC Security Leadership
HAO	Health Administration Officer
IA	information assurance
IAM	Information Assurance Management
IAT	Information Assurance Technical
IDC	Information Dominance Community (Name changed to Information Warfare Community)
IRR	Individual Ready Reserve
IS	Information Systems
IT	information technology
IWC	Information Warfare Community
KM	knowledge management

MPT&E	Manpower, Personnel, Training, and Education
MNO-MPC	Manual of Navy Officers Manpower and Personnel Classifications
N6 Department	Information Technology Department
NAVADMIN	Navy Administration (messages)?
NAVPERSCOM	Navy Personnel Command
NDU	National Defense University
NHRO	Navy Human Resources Officers
NHROC	Navy Human Resources Officers Community
NRCIO	Navy Reserve Chief Information Officer
NOBC	Navy Officer Billet Codes
NPC	Navy Personnel Command
NPS	Naval Postgraduate School
NHROC	Navy Human Resource Officers Community
NRCTO	Navy Reserve Chief Technology Officer
NAVRESFORCOM	Navy Reserve Forces Command
OCNR	Office of the Chief of Naval Reserve
PHR	Professional in Human Resources
SPHR	Senior Professional in Human Resources
SELRES	Selected Reserve
USN	United States Navy
USNR	United State Navy Reserve

# **EXECUTIVE SUMMARY**

## **BACKGROUND**

Full-Time Support Information Technology (FTS-IT) professionals rely mainly on self-efficacy and tacit knowledge communicated between junior and senior officers. The observed lack of a systematic methodology to transfer knowledge, collaboration, training, and development among the members of the FTS-IT officers present the problem addressed in this study.

The researcher is interested in leveraging a community of practice (CoP), supported by virtual platforms and other technologies, to:

- Capture, store, and transfer IT principles and career development knowledge,
- Construct Collaborative and training efforts to ensure that members attained the IT skills to manage FTS and NR IT infrastructure and met the DOD Cyber-workforce requirements,
- Design and implementation plan for CoP in FTS-IT will support knowledge management, training programs, mentorship, and social networking among the FTS-IT Professionals.

Although the researcher hopes that this study can be modeled into a DOD Cyber Workforce CoP, the scope is limited to the U.S. Navy Full-Time Support IT Professionals.

The researcher recognizes that the IT billets in the Navy Reserve Forces Command (NAVRESFORCOM) have been filled with officers who attain different navy designators. However, a billet historical review shows that more than two-thirds of these billets have been predominantly filled with Full-time Support (FTS) members of the Navy Human Resources Officers Community (NHROC). For example, Table one shows that currently, 18 IT billets are filled with FTS NHRO.

Table 1. Billets filled with Navy Designator 1207.  
Source: PERS-452, email communication (April 1, 2021).

Command	Function/ Title	Number of Billets
NRFIA WASH DC	CIO NAVRESFORCOM	1
NRFIA WASH DC	DCIO NAVRESFORCOM	1
NRFIA WASH DC	MGT Information Systems	1
BUPERS	Information System Security Manager	1
CNPC Reserve SPT	Program Manager	1
CNRFEC, Norfolk, VA	Management HQ—Communication, Computing, and Information Services/ ADP Plans	4
CNRFEC, Norfolk, VA	ADP Plans DEPT DH	1
Navy Region Reserve Component Commands (6 Regions)	ADP Plans Officer	5
NOSC Norfolk	ADP Plans Officer	1
Navy Air Logistic Office	Computing Services and/ Database Management	1
Program Executive Office for Manpower, Logistics, and Business Solutions	MGR DPJ FE/DAPM ENT SOFTWARE LICENSING	1

It is important to note that the researcher believes that NHROC proves to be fit to support the IT billets in NAVRESFORCOM and other IT billets under the Navy Manpower, Personnel, Training and Education (MPT&E). The NAVRESFORCOM has been supporting FTS-IT officers to obtain professional certifications, such as CompTIA Security+, CISSP, and GSLC, in addition to the PHR. Therefore, FTS HR officers are well

suited to support the IT billets within the NAVRESFORCOM and the USN personnel information system's readiness and development.

## **PROCESS, FINDINGS, AND RECOMMENDATIONS**

This qualitative case study followed a systematic data collection approach and data analysis based on the constant comparative methodology. The researcher used semi-structured interviews; thus, he applied a conversational style, which encouraged the participants to communicate freely and openly. Due to the participants' various backgrounds, the researcher categorized the questions into four categories to match the level of expertise and the future contribution to the FTS-IT CoP. The researcher used a purposive sampling methodology to select the participants (n=18). This sample of 18 participants produced more than 16 hours of verbal communications and further content analysis recommendations for future reviews.

The theoretical literature shows that a CoP consists of people who decide to create a platform to express their concerns, problems, and passion. Therefore, it encourages the community to develop self-efficacy. Thus, the members create this platform that enables members to support each other. The role of technology is essential in creating an effective CoP. The evolution of the CoP should lead to support the members' career development, training, knowledge management, and socialization (Hoadley, 2012; Pyrkoet al., 2017; Wenger et al., 2002).

The researcher, based on literature and the qualitative interviews, recommends the creation of FTS-IT CoP. This CoP should harness knowledge and attract talented professionals to join the community. Moreover, implementing this study in practice should embrace mentoring, social networking, training, and the FTS-IT CoP members' educational planning.

## **IMPLEMENTATION**

The IT leadership within NAVRESFORCOM showed support to the CoP idea. The Force CIO's support of the idea inspired the researcher to continue working on the research and investigate future implementation. Therefore, at the researcher's request, the Force

Chief Technology Officer (CTO) and the Deputy CTO approved the creation of a SharePoint site to host the FTS-IT. The researcher will continue working on the implementation of this model post this study.

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- Pyrko, I., Dörfler, V., & Eden, C. (2017). Thinking together: What makes communities of practice work? *Human Relations*, 70(4), 389–409. <https://doi.org/10.1177/0018726716661040>
- Wenger, E. (2010). Communities of practice and social learning systems: the career of a concept. In Blackmore, C. (Ed), *Social learning systems and communities of practice* (pp. 179–198). London: Springer.

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I want to take this opportunity to thank my academic advisors, Mr. Cook, and Mr. Bergin, for their support and guidance during this academic endeavor. I also appreciate the support I received to conduct this study from the NAVRESFORCOM CIO, CTO, and Deputy CTO: CAPT Gwendolyn Graves, CAPT Christopher Isbell, and Mr. Clinton Wadsworth. The support, guidance, and insights received from the academic advisors and the NAVRESFORCOM IT leadership made this study possible.

I appreciate Vice Admiral Kenneth Whitesell; while he was leading PERS-4, he selected and entrusted me to be the first Knowledge Manager for PERS-4. I also appreciate Rear Admiral John Meier, who trusted me to continue to serve as the PERS-4 KM. Under both admirals' leadership, I developed an appreciation for USN talent management and USN information systems and technology.

Finally, I want to take this opportunity to thank every team I have served with. I appreciate the discussions, enthusiasm, and insights. I hope this study will be a small contribution to building a Community of Practice for them and other members of the cyber workforce in NAVRESFORCOM. I hope it will inspire other researchers to build a model that can be replicated in the USN and DOD to help a community of IT professionals that I am honored to be a member of.



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# I. INTRODUCTION

## A. BACKGROUND

This study begins with examining the “case,” in which the active-duty component of the U.S. Navy Reserve manages the IT infrastructure of the USN Reserve Commands across the United States, Guam, and Puerto Rico, as shown in Figure 1. The term used to define this active-duty component is Full-Time Support. Ultimately, in this thesis, the researcher will show how the career structure of the IT members of the Full-Time Support is complex yet essential to accomplishing the U.S. Departments of Defense and the Navy’s missions.

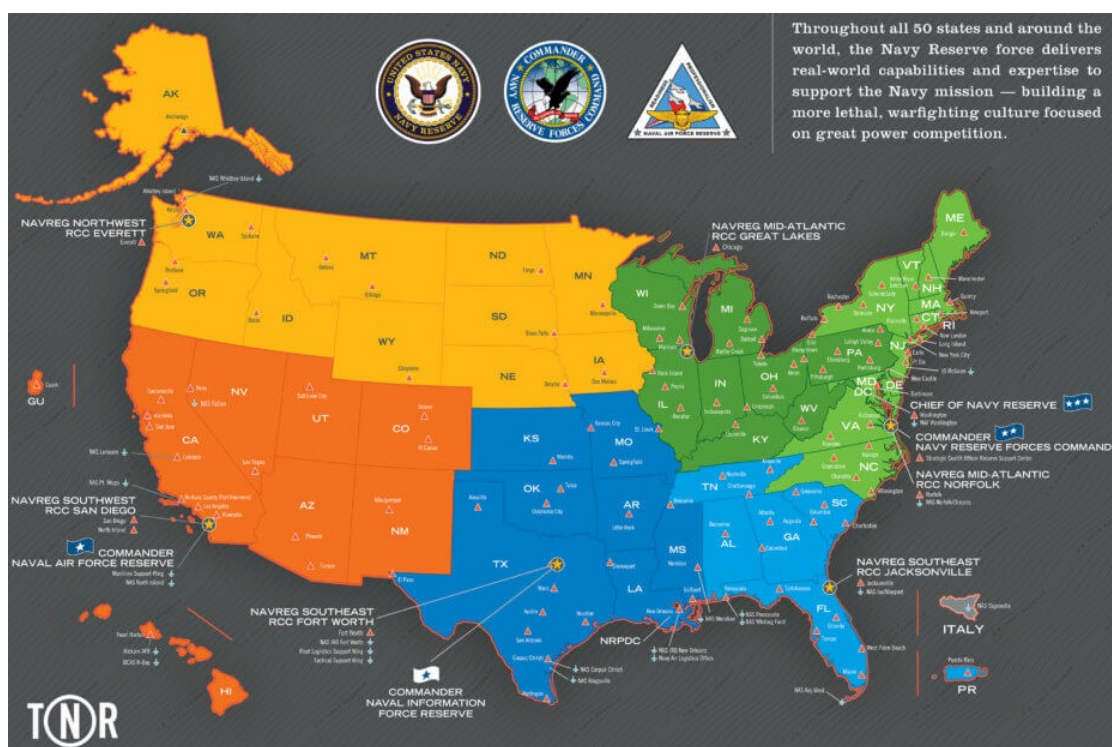


Figure 1. The Navy Reserve Component Commands. Source: The Navy Reservist (n.d.).

The U.S. Navy Reserve (USNR) has multiple hierarchal layers; therefore, for anyone interested in the CoP in the USNR IT, it is critical to introduce these multiple layers

to understand how the U.S. Navy FTS-IT operates. Moreover, it is essential to understand the relationship with other USN components. U.S. Navy Full-Time Support personnel serve in a supporting role of the U.S. Navy Reserve Commands across the United States and the globe. Additionally, the USNR is embedded in active-duty stations in the United States and throughout world theaters. Indeed, FTS is essential in ensuring the reserve personnel's continuous readiness to be deployed for U.S. and global missions.

Figure 2 depicts the administrative structure of the United States Navy Reserve (USNR, also known as NR); the terms USNR and NR will be used interchangeably in this thesis. USNR is one of the major components of the U.S. Navy. The USNR must always be ready for domestic and global deployments to support the needs of the fleet and the U.S. Department of Defense (DOD). The USNR personnel structure is divided into three distinct groups:

- *First group:* The Selected Reserve (SELRES),
- *Second group:* The Individual Ready Reserve (IRR), and
- *Third group:* The active-duty component of the Reserve, known as the Full-Time Support (FTS).

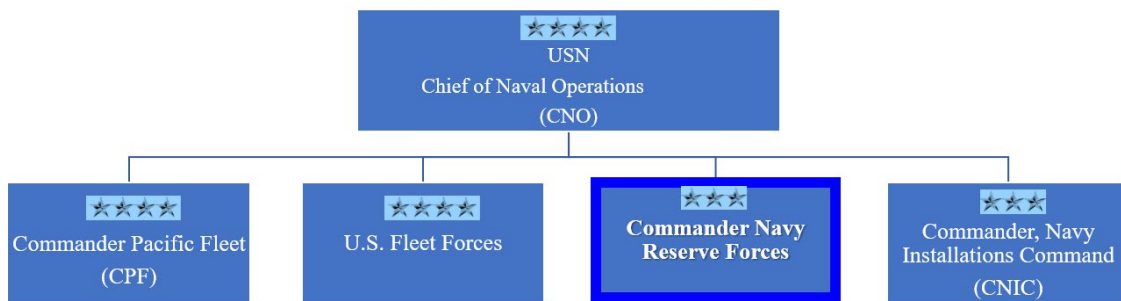


Figure 2. Administrative Chain of Command of the U.S. Navy. Adapted from the Navy Personnel Command [NPC] (n.d.).

In order to understand the FTS-IT, the researcher will first introduce the echelon levels of the USNR. Generally, the FTS personnel manage the daily missions and tasks of the USNR. The officers selected to support the Navy Reserve's IT needs are members of this third group. As stated earlier, the USNR is one of the major components under the U.S. Navy; it is known as the Commander Navy Reserve Forces (CNRF) and is commonly known as the Navy Reserve Forces Command (NAVRESFORCOM). The researcher uses the latter term in this research. As described in Figure 3, NAVRESFORCOM consists of six echelons. This figure also shows the relationship between each echelon and the IT leadership. In the NAVRESFORCOM, the IT personnel is commonly known as the N6, who may serve in the roles of CIO, CTO, Director of IT, or just the N6.

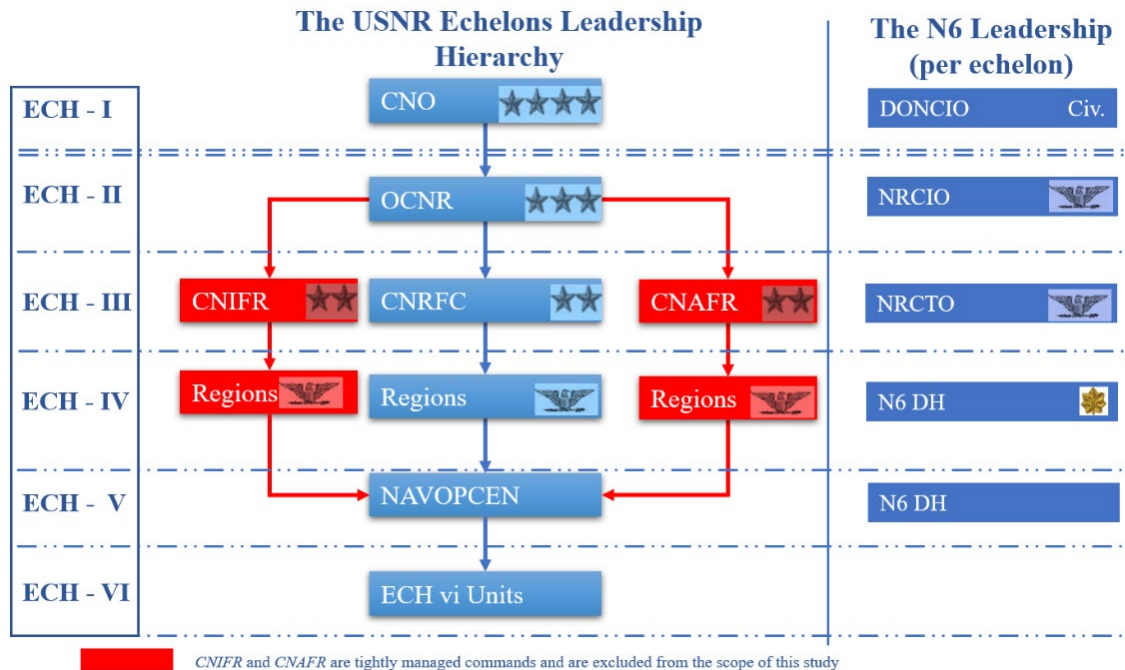


Figure 3. The Hierarchy of the NARESFORCOM.  
Adapted from NR Homeport (n.d.)

The first echelon in the NAVRESFORCOM is Echelon II, which is the Office of the Chief of Naval Reserve (OCNR or just CNR). The CNR is generally a vice-admiral who reports directly to the Chief of Naval Officer (CNO). At Echelon II of the NAVRESFORCOM, a Navy Captain (O-6) assumes the Force CIO role. The head of the

N6 at Echelon III serves in the role of the NRCTO, and typically, a Navy captain fills this billet. At Echelon IV, the N6 department head serves as a director of the IT Department at one of the NAVRESFORCOM regions' headquarters.

Indeed, the structure of the FTS-IT workforce is unique and relatively different than its active-duty counterpart. For example, while the active duty might be taking part in a command network administration, especially afloat, the FTS IT members manage large-sized projects on a region or a larger level to ensure the readiness of the SELRES to augment the fleet and meet other operational demands. However, in managing the daily IT activity, the FTS-IT professionals have the same expectation that active-duty has in managing and protecting the USN networking, cybersecurity, and access to the NIPR and SIPR networks. Moreover, both NR and active-duty component IT professionals must have and maintain the same professional certifications, which is governed by the DOD instructions on the Cyber workforce. Among these certifications are the GSLC and CISSP (Commander, Navy Reserve Force [COMNAVRESFOR], 2014; Department of Defense Chief Information Officer [DONCIO], 2015).

The active component of the U.S. Navy established a dedicated community to serve in IT roles. This community is known as the Information Professional Community (IP), with an 1820 navy designator. However, as of the research date of this study, the USNR has no IP community. Generally, FTS commissioned officers, frequently with the Navy Designator 1207, serve in and lead the USN FTS-IT Departments in the commands that fall under the NAVRESFORCOM (Figure 3). However, it is not unusual to find other FTS officers with the appropriate IT NOBC serving in IT roles.

The researcher believes that launching FTS-IT CoP ensures the NR's readiness to support the fleet and DOD's needs. The FTS-IT community members receive no initial IT training, and because there is no established CoP, the junior FTS-IT officers rely on the senior mentors' tacit knowledge. Therefore, the researcher envisions building an FT-IT CoP based on knowledge management principles to facilitate the FTS-IT officers' training, education, and development.

## B. PROBLEM STATEMENT

The initial observation depicts FTS-IT professionals rely mainly on self-efficacy and tacit knowledge communicated between junior and senior officers. The lack of a systematic methodology to transfer knowledge, collaboration, training, and development among the members of the FTS-IT officers present the problem which will be addressed in this research. The problem addressed here is multidimensional and can be identified within four categories:

First, Knowledge Management: The lack of a methodical way of collaboration and knowledge management steers the FTS-IT members to rely on tacit knowledge within senior officers' mentoring instead of an explicit body of knowledge. In addition, the retirement of the senior officers of the FTS-IT may cause a loss of tacit knowledge. Moreover, based on the researcher's initial observation, many senior officers are tasked to fulfill these new roles due to increased new strategic initiatives. This predicament could be twofold: first, the problem of having access to senior mentors. Second, providing mentorship and guidance while responding to these new initiatives makes it hard for senior officers to maintain a balance between mission, family, and mentoring roles.

Second, Multiple Navy Designators and Civilian Workforce Managing NAVRESFORCOM IT: Due to the investment in training and certification, the FTS-IT billets are mostly managed by the Navy Human Resources Community (NHROC) with navy designator 1207. However, some officers are not 1207-IT officers; these latter groups may earn Navy Officer Billet Codes (NOBC); therefore, these officers also serve in FTS-IT billets. Additionally, at the management level of FTS-IT functions, many civilian workers should collaborate and direct the IT operations in the Navy IT-FTS and NR. Therefore, with these complex structures and various backgrounds, a CoP will create a common platform that assists FTS-IT and other IT professionals in the NAVRESFORCOM.

Third, Lack of Platform that Connects FTS-IT Professionals: As stated in the second problem statement, the FTS-IT professionals are spread throughout the uniformed navy designators and the civilian workforce. However, no platform connects the entire

FTS-IT. Most of the social and professional functions are geared to the main community that the officers or the civilian personnel are members of.

*Fourth, The risk of Organizational Memory Loss:* Researchers suggest that organizational memory “decays over time” (Casey & Olivera, 2011). The most important reasons for attributing organizational memory loss are the members’ turnover and the individual’s role in forgetting organizational memory. In FTS-IT’s case, the turnover can be related to policies, such as promotions, reduction of force, or moving to different military functions. In some cases, the community members cause the forgetting organizational memory; this intentional loss of memory could be because of a temporary assumption of a new naval post that requires establishing different organizational memory or because of individuals applying their methodologies.

### **C. PURPOSE STATEMENT**

This thesis aims to provide an analysis of the potential implementation of a CoP model in the FTS-IT. The researcher analyzes the existing structure of the FTS-IT to determine whether a model of CoP can facilitate the establishment of a robust social and professional network for the FTS-IT community to accomplish collaboration, knowledge sharing, social network, and training and development. Therefore, the researcher is interested in leveraging a CoP, supported by virtual platforms and other technologies, to:

- Capture, store, and transfer IT principles and career development knowledge,
- Construct Collaborative and training efforts to ensure that members attained the IT skills to manage FTS and NR IT infrastructure and met the DOD Cyber-workforce requirements,
- design and implementation plan for CoP in FTS-IT will support knowledge management, training programs, mentorship, and social networking among the FTS-IT Professionals.

It is important to note that this study's scope is limited to the Navy Full-Time Support IT Professionals. The FTS-IT professionals are members of the DOD Cyber workforce, and the researcher does not suggest changing this established relationship. On the contrary, this study's result should lead to better interaction and collaboration internally within the Uniformed FTS-IT, the NAVRESFOR civilian personnel, and externally with other DOD Cyber workforce members. Therefore, the study investigates CoP as a method that leads to improving communication, mentoring, collaboration, and social connection among the members of the FTS-IT and enables collaboration with the DOD Cyber workforce.

#### **D. RESEARCH QUESTIONS**

1. How could a CoP enable knowledge sharing, as an aspect of knowledge management, in the FTS-IT community to mitigate organizational memory loss?
2. How could a focused CoP framework enable learning in the FTS-IT?
3. How could a CoP framework enable training and collaboration in the FTS-IT?
4. What is an implementation plan for FTS-IT CoP?

#### **E. THESIS STRUCTURE**

The researcher presents this thesis in the following order:

**Chapter I:** This chapter presents an introduction to the core concepts and the study's scope. Additionally, this chapter highlighted the problem statement and presented the research questions.

**Chapter II:** In this chapter, the researcher presented a literature review driven from the multidisciplinary resources. The literature analysis was divided into two main categories: first, content analysis of literature published by the DOD and DON organizations, while the second part analyzed related work from the research communities.



**Chapter III:** The researcher presents the research methodology, including the data collection approach and analysis methods.

**Chapter IV:** In this chapter, the researcher provides the analysis and the findings based on the collected data.

**Chapter V:** in this chapter, the researcher discusses the future implementation of the CoP model within the NAVRESFORCOM.

**Chapter VI:** As the final chapter of this study, the researcher presents the summary, recommendation, and recommendation based on this study.

## **II. LITERATURE REVIEW**

In addition to literature from the research community, this literature review includes official directives and policies issued by the Navy HR Community, Navy Reserve, DOD and DON CIOs, and the Navy Personnel Command. These policies and directives focus on the DOD and USN cyber-workforce. Therefore, the literature review is divided into two major sections; the first covers the DOD and USN directives, policies, and other official data. The second section in the literature review analyzes the theoretical and conceptual foundations of the pillars of the CoP. These pillars are knowledge management, learning, training, and community development.

### **A. DOD AND USN OFFICIAL LITERATURE**

#### **1. FTS and HR and 1207-IT Background**

##### ***a. Navy Full-Time Support***

As indicated in this study's introduction section, FTS constitutes the third group that forms the NAVRESFORCOM structure. Members of the FTS include the active-duty segment of the NAVRESFORCOM. The formation of the FTS was not a mere executive or departmental decision; this formation is based on a statutory foundation. According to Title 10 of the U.S. Code, the USNR operates as "a separate command of the Navy" (10 U.S.C. § 10172). Historically, the Naval Reserve Act of 1938 reorganized and regulated the Naval Reserve, which consisted of "Fleet Reserve, the Organized Reserve, the Volunteer Reserve, and the Merchant Marine Reserve" (Federal Register, 1943). The FTS personnel assume the duty of running the installation and personnel's daily activities under the NAVRESFORCOM and ensuring that the reserve forces are trained and ready for worldwide mobilization at any time. The FTS-IT manages the IT infrastructures around all Navy Operation Support Centers (NOSCs) in the United States and U.S. Territories.

***b. Evolution of Navy Human Resources Officers Community and IT Support***

In its mission statement, the Navy Human Resources Officer Community (NHROC) defined itself as a “community focused on utilizing our expertise in manpower, personnel, training, and education to achieve the Community vision in support of the Department of the Navy’s mission accomplishment” (Navy Human Resources Community, 2012, p. 4). This definition includes all the 120x designators, including the 1207-IT. However, this mission statement does not refer to the IT role as one of the HR officers’ functions. As demonstrated in Figure 4, NHROC comprises four core competency areas: Development, Management, Recruiting, and Requirements. It is important to note that the IT function is implicitly listed under the HR community’s *Requirements Core Competency*. Therefore, the current HR community does not have a separate IT core competency; instead, the IT function is a sub-role of core competency. Consequently, it is essential to note here that when the researcher uses the term 1207-IT, he refers to the NHROs selected to serve in IT billets. Meanwhile, these officers attain the Navy IT NOBC, obtain IT certifications, and complete IT-related education and training.

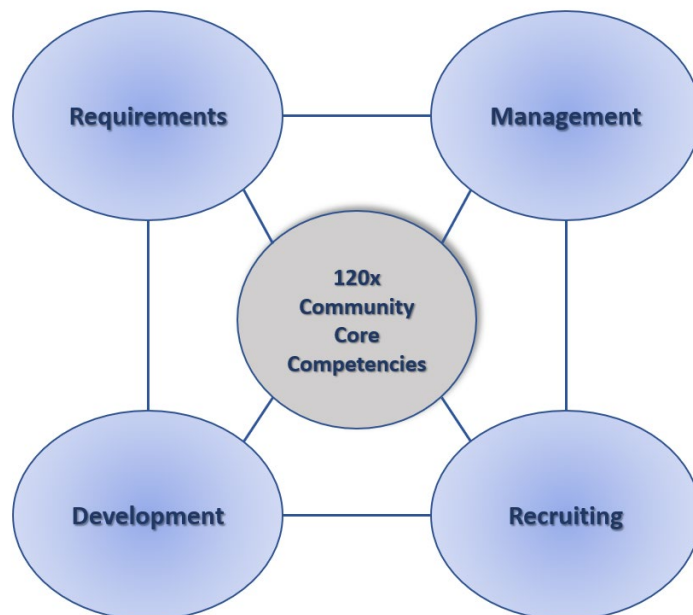


Figure 4. U.S. Navy Human Resources [HR] (120x) Community Core Competencies. Adapted from the Navy Human Resources on NPC (n.d.).

Two separate sites are used to post updates of the career development and other updates of the NHROC. These two sites are hosted on two different platforms to meet different purposes:

- First, NHROC Detailing and Community Management: This site is hosted on the Navy Personnel Command (NPC) pages.
- Second, the NHROC has a physical location known as the Human Resources Center of Excellence (HRCOE) on the Naval Postgraduate School campus. The HRCOE established another community portal hosted on the NPS' Sakai Learning Management System. The site offers updates on different HR professional certifications, mainly the Professional Human Resources (PHR) and the Senior Professional Human Resources (SPHR). Frequently, the site includes updates and messages from different HR region captains and other HR community leaders.

Both portals are essential for the career management and planning of NHRO. However, both portals are not explicitly geared toward FTS officers serving in IT billets; therefore, the career planning of FTS-IT officers depends on mentoring and self-efficacy. Appendices A and B show snapshots of the contents of these sites.

As indicated in Table 1, currently, the 1207-IT officers fill 18 IT billets. A small group of Human Resources FTS officers earned NOBC, training, and education in IT/IS; therefore, this small group has been selected to serving in IT billets in NAVRESFORCOM, BUPERS, and possibly in other active component's commands. The members of 1207 who have been serving in IT billets show remarkable resilience and proficiency in leading IT roles. Based on the data provided by PERS-452, some of the IT billets from 2013 to 2021 are filled with officers with the 1207 FTS-HR officers who attained Navy IT NOBC and subspecialties (email communication, April 1, 2021). Furthermore, this data shows that the NAVRESFORCOM CIO, CTO, and DCIO are filled predominantly with 1207 officers. It is important to note that the researcher believes that NHROC is fit to support the IT billets in NAVRESFORCOM and other IT billets under the Navy Manpower, Personnel, Training and Education (MPT&E). The NAVRESFORCOM has been supporting FTS-IT officers

to obtain professional certifications, such as CompTIA Security+, CISSP, and GSLC, in addition to the PHR. Therefore, FTS HR officers are well suited to support the readiness and development of the USN personnel information system.

Table 1. Billets filled with Navy Designator 1207. Source: PERS-452, email communication (April 1, 2021).

Command	Function/ Title	Number of Billets
NRFIA WASH DC	CIO NAVRESFORCOM	1
NRFIA WASH DC	DCIO NAVRESFORCOM	1
NRFIA WASH DC	MGT Information Systems	1
BUPERS	Information System Security Manager	1
CNPC Reserve SPT	Program Manager	1
CNRFC, Norfolk, VA	Management HQ—Communication, Computing, and Information Services/ ADP Plans	4
CNRFC, Norfolk, VA	ADP Plans DEPT DH	1
Navy Region Reserve Component Commands (6 Regions)	ADP Plans Officer	5
NOSC Norfolk	ADP Plans Officer	1
Navy Air Logistic Office	Computing Services and/ Database Management	1
Program Executive Office for Manpower, Logistics, and Business Solutions	MGR DPJ FE/DAPM ENT SOFTWARE LICENSING	1

## 2. Other Designators and IT Sub-specialties

Policies and career development materials about the community of the naval designator of 1820 and other Navy IT sub-specialties are the primary sources of the literature for this research. Under the NAVRESFORCOM, no FTS-IP community was established as of the date this study is conducted. However, during the interviews, some

participants provided information and data that implies that an FTS-IP community might be established in the near future. The 1820 community has a well-structured career path for the Information Professional Officers Career Progression Figure 5. The Naval IP officer's career establishes a career development structure that values enhancing the officers' leadership skills, IT training, and IT education.

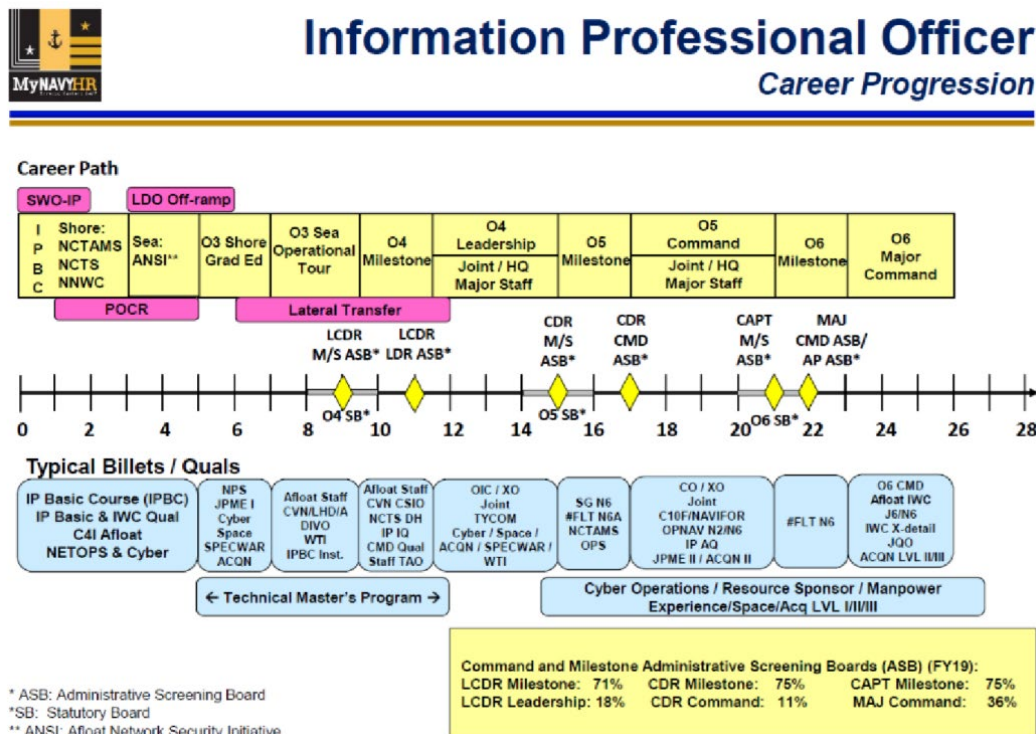


Figure 5. Information Professional Career Progression. Source: NPC (n.d.).

The IP Community was officially created in July 2001 in a Naval Administration (NAVADMIN) message number 182/201 (Layne, 2006); however, since there was no IP FTS community established; upon the creation of the NHROC in 2007 with NAVADMIN 042/07, the FTS Human Resources officers, with designator 1207, have been filling the majority of the IT billets in NAVRESFORCOM and other BUPERS posts.

The IP officers' community maintains a portal that functions as a one-stop hub for all IP officers to stay connected with their peers and mentors. The IP officer community vision indicates that IP officers are expected to “harness technology, information and

knowledge to ensure battlespace dominance and mission success” (Cyber-Center United States Naval Academy [Cyber-Center USNA], n.d.). The IP officers must attain naval AQDs and NBOCs to prove their professional competencies. However, as indicated in Appendix C, the IP officers are members of the significant community of the Information Warfare Community (IWC); therefore, IP officers pursue AQD designated for the IWC.

Without conducting an in-depth analysis of the IP community’s career alignment and talent management, the IP community is a subcommunity of the IWC, including other navy designators that do not necessarily deal with IT from an enterprise perspective. IT roles in an organization should be geared toward infrastructure modernization to keep the organization functioning in this digital age. According to the Manual of Navy Officers Manpower and Personnel Classifications (MNO-MPC), Table 2 represents the officers’ communities included under the IWC (NPC, 2020, p. A-11).

Table 2. Restricted Line (Information Warfare Community). Adapted from the Manual of Navy Officers Manpower and Personnel Classifications (2020).

Navy Designator * (Officer Code)	Description
180x	Special Duty Officer— <i>Oceanography</i>
181x	Special Duty Officer— <i>Cryptologic Warfare Officer</i>
182x	Special Duty Officer— <i>Information Professional Officer</i>
183x	Special Duty Officer— <i>Intelligence Officer</i>
184x	Special Duty Officer— <i>Cyber Warfare Engineer</i>

\*NOTE: the “x” in the officers’ designators is replaced with 0, 7, or 5, which indicate active component, FTS, or USNR, respectively.

Therefore, despite the IP community's maturity and the clarity of IP officers' career timeline, the IP community is administratively and professionally mixed with other communities that may ultimately impact the IP community's knowledge acquisition and career development.

### **3. Other Designators, and Other IT Sub-specialties**

#### ***a. Navy Supply Officers: Logistics—Information Technology 1309x***

The USN supply officers have a naval designator of 3100, 3107, and 3105, who serve on active, FTS, and SELRES status, respectively. The supply officers who serve or are assigned to serve in Logistics—Information Technology must obtain the subspecialty 1309x; one method to obtain this specialty is the pursuit of Curriculum number 870 of the Master of Business Administration. Upon successfully completing the degree requirement, the officer attains the subspecialty 1309P (Graduate School of Defense Management n.d.).

The Navy Supply Officers Logistics—Information Technology (NSUPPO-IT) role is significant during this critical stage of the USN IT modernization and moving the Naval ERP to a cloud computing methodology (Wendelken, 2018). The NSUPPO-IT is becoming more critical in this modernization and migration to the cloud since the USN relies on creating and analyzing big data analytics in all its commands ashore and afloat. However, beyond the NPS curriculum 870, no platform connects the NSUPPO-IT.

#### ***b. Medical Service Corps Officer (Navy BUMED)***

The Medical Service Corps Officers, also known as Healthcare Administration Officers (HAOs), have the Navy Designator 2300. As indicated in the Navy Personnel Code manual, as shown in Table 3, there is no specific designator code for the officers managing the IT infrastructure for the BUMED. However, these officers selected to serve in IT roles tend to continue managing IT infrastructure within BUMED facilities in the United States and globally. NPS has coordinated with BUPERS-315 to offer the HOA curriculum Number 386, which satisfies the skills requirements for the Network Operations and Technology Curriculum 6209x (NPS Office of the President, 2013). The HAOs assigned to IT serve in several IT roles in naval hospitals and other BUMED installations.



Table 3. Medical Service Corps Officers (Designator 230X).  
Source: NAVPERSCOM, (n.d.)

Billet Code	Billet Description	Officer Code	Officer Description	Officer Community Manager (OCM)
2300	Staff Corps Officer billet requiring Medical Service (Health Care Administration, Medical Allied Science, Optometry, Pharmacy, or Medical Specialist) Specialty	230X	A Medical Service Corps Officer	BUMED-15

#### 4. The Department of Navy Cyber-Workforce

The DOD cyber workforce was established in accordance with Public Law No. 114–113 (DoDI 8140.01, 2020). The DOD Instruction 8140.01 provides the foundation of integrating the cyber workforce framework across the DOD and the DHS. To determine the cyber workforce’s training and certifications, DOD 8570.01-M designed multilayer certifications requirements to match talent with the jobs and billets’ requirements.

It is essential to acknowledge that in the DOD 8570-M, among other directives and policies, the term Information Assurance Workforce (IA Workforce) is used as a synonym for the cyber workforce. In determining the certification requirement, the directive distinguished between the two types of IA professionals: the Information Assurance Technical (IAT) category and the Information Assurance Management (IAM) category. Figure 6 is significant in conducting analysis to which category and training and certification are required. The officers of the FTS-IT are required to meet the IAM education, training, and certification requirements as per the DOD directive. Nevertheless, it appears that the career IP community members match the IAT categories. Appendix D shows the summarized cyber workforce.

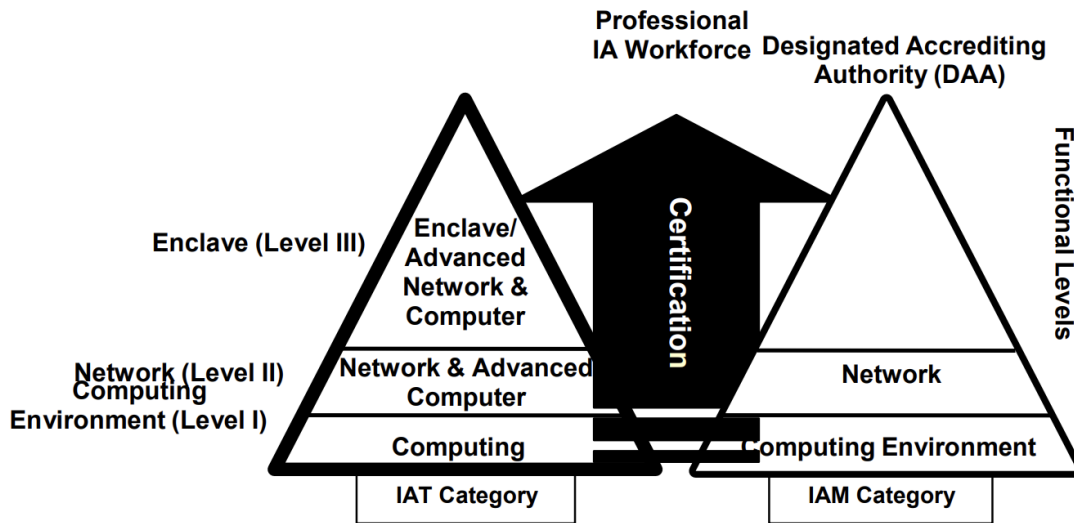


Figure 6. Basic IA (Cyber) Workforce Structure.  
Source: DOD 8750-M, (2015).

The researcher intends to use the official literature to shed light on the current state of the FTS-IT. Meanwhile, he plans to rely on the academic literature to guide him in this exploratory research in answering the initial research questions. This process of continuous and dynamic analysis should lead to a well-established implementation of FTS CoP.

## B. THEORETICAL LITERATURE: COMMUNITY OF PRACTICE

### 1. Community of Practice—General

In their seminal work, Wenger, McDermont, and Snyder (2002) suggested that CoP consists of people who decide to get together to create a platform to express their concerns, problems, and passion. Based on this view, a CoP model encourages the community members to continue collaboration and knowledge sharing. Therefore, the members are engaged continuously to find solutions for the problems that can become future lessons learned; they do not react to situations. The research of Wenger, McDermott, and Snyder also suggested several reasons that motivate people to join the CoP; among these reasons is the value addition, such as an increase in knowledge or efficiency. One of the most critical factors in a successful of a successful CoP is having a leader, or a coordinator, who keeps the community connected.

Hoadley (2012) suggested that CoP is a theoretical framework that embraces a learning model; the learners must have a sense of community and access to subject matter experts. Information technology and information system methodologies should be essential in supporting the CoP. Therefore, capturing and sharing knowledge should rely on the community's experts' tacit knowledge and systematic knowledge capturing methodologies based on IT and IS. Although some practitioners consider the CoP and a community of expertise synonymous, Hoadley calls attention to the differences between the two concepts. The CoP must establish a knowledge base and create a methodology to share this knowledge and collaborate with its members. However, while CoP promotes knowledge sharing, it extends to building a strong connection between members.

## **2. The Means to Implement CoP**

### ***a. Knowledge Management***

The CoP concept encompasses the conceptual framework of knowledge sharing and embraces the idea of “thinking together” (Pyrko et al. 2017). Therefore, it is crucial to establish a systematic approach that embraces knowledge sharing and collaboration within a CoP framework.

Dickinson and Marken (2015) suggested a nexus between the concepts of knowledge management and CoP. Knowledge management is a method of communicating a captured body of facts between an organization's members or a community. The CoP views knowledge as a dynamic object reflecting on the members' skills, abilities, and knowledge. Based on this view, mentoring between the members of the CoP is one of the processes of indoctrinating new members into the CoP. Dickinson and Marken suggested in their article that this indoctrination may not require depth in introducing the community, assuming that the new entrants into the CoP are professionals with at least some basic knowledge. One significant difference between the model presented in this study and the reality of the Naval FTS-IT personnel at Echelon V is that, in many cases, the Echelon V IT personnel lack foundational professional knowledge.

Smith, Hayes, and Shea (2017) presented an extensive qualitative literature review of 41 studies that directly analyzed the CoP framework. This study offers a detailed

analysis that helps researchers to test different models of CoP frameworks. The CoP as a social platform enables its members to create and share knowledge and learning, distinguishing the CoP from other knowledge-sharing media. Based on a large number of analyzed literature, the authors implied that the CoP is a comprehensive social structure that evolves with time into professional identity.

Stein (2005) conducted a qualitative study that confirmed the value of a CoP in establishing a solid foundation for professional groups' knowledge management and learning infrastructure. His research's point of departure is grounded on the assumption that a CoP framework should maintain itself and self-evolve, based on the adopted model's initial, inherited structure. Stein suggested that the CoP must have a clear mission to sustain growth. Several elements lead to the success of the CoP, among them the knowledge asset of the members and social networking. The knowledge management concept embraces the CoP evolution into different phases, from the formation phase to sustainment and progress.

Housel and Bell (2001) suggested that the "spawning of knowledge involves a partnership between human cognition and machine-based intelligence" (p. 4). Therefore, the knowledge management model that supports a CoP should take advantage of the technology. Housel and Bell suggested the categorization of knowledge, whereas knowledge can be divided into different categories: "label knowledge," "process knowledge," "skill knowledge," and "people knowledge" (pp. 11–12). These four categories of knowledge are what should create the knowledge boundaries of the CoP. Knowledge management enhances the use of organizational knowledge capital through the maximization of established tacit knowledge.

Kimble and Hildreth (2005) suggested that knowledge management and CoPs are connected. While the CoP's foundation is the motivation and strong desire to maintain community, sustaining the CoP can be achieved through an e-communication methodology to keep the CoP member motivated and knowledgeable. The CoP must ensure having a continuous line of communication to foster a culture of trust in the group. A community with sufficient means of communication extends its knowledge base and helps community members trust each other, making it easier to share knowledge among the group members. The CoP creates shared tools and processes, which are the foundation of the group's

knowledge. Therefore, according to Kimble and Hildreth, “when knowledge is viewed as duality, we see that only the harder aspects are reified” (p. 104). Therefore, to make the knowledge applicable to a community, the group members must reconstruct it to match the community’s need without losing the knowledge’s original value.

***b. Technology and CoP***

Technology is an essential element in maintaining communication and collaboration among team members in several geographical locations. In the research of Russell, Parker, Bolden, and Sherman (2011), they used a case study to show how CoP and knowledge management play a significant role in connecting members who are geographically scattered. Therefore, such a model can resemble the case of the Echelon V commands of the NR.

***c. CoP embraces Learning and Training***

As indicated in the literature above, CoP is a comprehensive structure that includes professional, social, knowledge management, and learning. The researcher investigates how CoP can help the community leadership evaluate and create learning and training models for the community members. Embracing the CoP ensures transparency and assists officers in planning for learning and training to achieve higher proficiency in their job.

Bandura introduced the theory of social learning in his seminal work and additional research (1971, 2006); he suggested that individuals learn through direct experience or observation of others. The credible mentor’s role is invaluable as such an individual becomes an influential figure on the learners in an organization. Moreover, Bandura explained that learning is achieved through incorporating the environment, the learners’ self-efficacy, and the trainers’ influence. However, it is essential not to ignore the importance of modeling and peer influence. The researcher believes that CoP can establish this model that facilitates learning by observing and interacting with the community’s leaders and other members.

Wenger (2010) suggested that the conceptual foundation of CoP was developed from the social nature of human learning. Weinger further stated that a CoP is established

based on learning, which later transforms into a “dynamic structure among the participants” (p. 180). Learning is not an individual task that leads to a mere knowledge or skills acquisition; it should lead to a community’s competence. According to Wenger, both the social learning theory and the concept of CoP should lead to the creation of the community’s identity. The structure of a body of knowledge in a community is based on practices in the form of “research, teaching, management, regulation, professional associations, and many other contexts” (p. 183). To achieve a unique identity of an organization, the community members should deploy three modes: engagement, imagination, and alignment. The community achieves engagement when its members are engaged in activities. Imagination in the context of CoP means that the members construct a unique image of their environment. This imagination process leads the members to better orient themselves with the environment, which leads to optimization of the members’ participation. Alignment ensures that the CoP is organized and that tasks are executed.

Thus, the researcher conducted a content analysis of literature that focuses on theoretical, conceptual foundations of CoP, knowledge management, learning, training, and community development.

### **C. CHAPTER SUMMARY**

The preliminary analysis in the literature emphasized the importance of using technology in establishing a CoP; however, despite its importance, technology is not the creator of the CoP. Additionally, the literature differentiated between CoP and the community of knowledge. Knowledge management principles to embrace a CoP are crucial to its success; however, KM is only one of the elements that constitute a CoP. A CoP should not be considered a mere outcome; it is the means for professionals, such as FTS-IT, to help their members develop, train, socialize and learn.

The literature shows illustrate that there is no DOD-comprehensive CoP for all IT professionals. DOD CIO and other cyberspace organizations created resourceful knowledge communities; however, these are not CoP as indicated in this research. Also, the literature showed that most of the naval officers’ IT communities are subcommunities of other communities. For example, FTS-IT currently under the NHROC, the IP

community is under the IWC, and the Logistics IT is under the NAVSUP. Furthermore, it is essential to note that the IP community, which was created to maintain the USN IT infrastructure, is mixed with other unrelated career fields, such as Oceanography and Naval Intelligence.

### **III. METHODOLOGY**

#### **A. RESEARCH DESIGN**

In this qualitative case study, the researcher investigates applying the CoP principles to the officers who are members of the Navy Full-Time Support serving predominantly to support IT roles within the NAVRESFORCOM. According to Yin (2012; 2009), a qualitative case study is an “empirical inquiry about a contemporary phenomenon (e.g., a “case”), set within its real-world context” (p. 4; p. 18). Therefore, this definition guides the research direction into analyzing the benefits that a CoP will add to the collaboration, career development, and training of the FTS-IT. The basis for the data analysis and the data coding used in this qualitative study is based on the constant comparative method; this method “combines systematic data collection, coding, and analysis with theoretical sampling to generate theory that is integrated, close to the data, and expressed in a form clear enough for further testing” (Conrad et al., 1993, p. 280). This model was closely followed in this research, especially that upon completing this study, the researcher will implement this model in the NAVRESFORCOM under the guidance and support of the force CIO and CTO.

#### **B. PROCEDURES: QUALITATIVE ANALYSIS OF INTERVIEWS**

the researcher in this qualitative study examined the benefits that a CoP will add to the FTS-IT. The research questions guided the process of formulating the interview questions. Therefore, in the study’s early stages, the researcher established a nexus between the research questions and the interview questions (see Table 4 and Appendix E). Understanding that the feedback might differ from participants based on their community tenure, seniority, and knowledge levels. The researcher developed four participant categories; then, he created the instrumentation and communications methods. This process was not linear; it was more interactive and dynamic, requiring several revisions and reorientation until reaching the final model to construct the data collection and analysis.



## **1. Data Collection Approach**

### ***a. Selection of Participants and Methods of Communication***

The questions are designed to meet two goals: first, the participants' unique population; second, the researcher's intention to create a nexus between the data collected and the research topics. Therefore, the categories of the interviews' questions were based on the following structure:

- i. Common questions for all groups.
- ii. Questions directed to the Junior Members of the Navy Designators 1207/IT (O1–O4).
- iii. Questions directed to the Senior Members of the Navy Designators 1207/IT (O5–O6).
- iv. Questions directed to the members of the Navy IP Community (Designators 1820), as established Naval IT community (Comparative Model).
- v. Questions directed to the Senior Members of the Navy Designators 1207/IT (O5–O6). The questions in these categories were for senior NHRO who are not IT professionals. These interviews were the least structured.

In the next section, the researcher will discuss the process of selecting, and the reason for selection, of participants from these groups and means of communication.

#### **(1) Participants' Selection**

Creswell, Hanson, Plano, and Morales (2007) suggested that participants in the case study should be able to provide answers to help in developing “an in-depth understanding about how different cases provide insight into an issue or a unique case” (p. 239). Furthermore, Creswell et al. suggested that the analysis in a case study occurs within a bounded system, which in this study is the NAVRESFORCOM IT system. Therefore, the researcher created the categories stated in this chapter; furthermore, he selected participants mainly from the uniformed military professionals who work in IT in the USN.

The researcher used a purposive sampling approach to select the participants. According to Tongco (2007), purposive sampling is nonrandom because of the participants' qualities of knowledge. Moreover, the number of the participants was not the main element to determine when to stop seeking more participants; instead, the focus was on the qualities of the data collected, the qualities of the participants' background, and the

triangulation of data collection to determine reaching a saturation point (Tongco, 2007; Nowell & Albrecht, 2019). Therefore, understanding the participants' background and expertise in answering the research questions and, therefore, it plays a significant role in implementing the CoP in NAVRESFORCOM. The researcher categorized participants based on professional community and seniority. The overall sampling was homogenous, as all participants, except one, were working in the IT field in the USN.

Participants were informed earlier in the recruitment email (Appendix F), and during the interview, participation is voluntary; participants were informed that they could refuse to answer any question or withdraw at any time. Due to the participants' and the researcher's prior knowledge of each other, the interview was smooth, and there was a high level of trust, which led to sharing much-related information and literature with the researcher. These resources and the interviews were invaluable in refocusing the conceptual basis of this study.

Table 4. Participants Purposive Sampling

Level of Seniority					
Participants Category	Military Rank	Equiv. Civ. Grade	No. of Participants	IT Pro.?	Reason of Selection
ii	O1–O4	GS9–GS11	n =5	Yes	<ul style="list-style-type: none"> <li>▪ This group included Jr. FTS NHRO serving in IT Billets</li> <li>▪ Questions pertain to the FTS-IT community.</li> </ul>
iii	0-5–06	GS 13 +	n =5	Yes	<ul style="list-style-type: none"> <li>▪ This group included Sr. FTS NHRO and sr. civilians serving in IT Billets in NAVRESFORCOM</li> <li>▪ Answer questions pertain to: <ul style="list-style-type: none"> <li>▫ FTS-IT community.</li> <li>▫ FTS-IT and NHROC evolution</li> <li>▫ Strategic change in FTS-IT</li> <li>▫ Sponsoring future implementation of FTS CoP</li> </ul> </li> </ul>
vi	O1–O4	GS7–GS11	n =6	Yes	<ul style="list-style-type: none"> <li>▪ This group included officers from other communities serving in IT Billets</li> <li>▪ Questions pertain to IT career development in their communities. <ul style="list-style-type: none"> <li>▪ Reasons: <ul style="list-style-type: none"> <li>▫ Communities' comparison</li> <li>▫ Lessons learned for future CoP implementation</li> </ul> </li> </ul> </li> </ul>

Level of Seniority					
Participants Category	Military Rank	Equiv. Civ. Grade	No. of Participants	IT Pro.?	Reason of Selection
v	0-5-06	GS 13 +	n =2	No	<ul style="list-style-type: none"> <li>▪ This group included Sr. NHRO (Active/ FTS) and/or sr. civilians NOT serving in IT Billets in NAVRESFORCOM</li> <li>▪ Answer questions pertain to: <ul style="list-style-type: none"> <li>▫ NHROC and nexus to FTS-IT.</li> <li>▫ Evolution of FTS-IT and NHROC</li> <li>▫ Voice of the Customer (what IT customers expect from NRHO IT)</li> <li>▫ Support &amp; Integrate future implementation of FTS CoP</li> </ul> </li> </ul>

Table Notes:

1. Questions presented to category “v” were the same as Category “iii.”
2. Category “i” is the entire sample. The questions were primarily demographic (excluded from this table).
3. sample size (n =18)

(2) Interviews Process and Communication Methods

The participants were offered several communications options for the interviews, including MS Teams, Zoom, and in-person. Moreover, one participant requested to be interviewed asynchronously via email. The COVID-19 pandemic made the in-person interviews unlikely; therefore, all the synchronous interviews were conducted via face-to-face virtual interviews.

Appendix E has a complete list of interview questions that the researcher sent to the participants. Most of the participants were known to the researcher. However, participants were kept anonymous from each other. Emails inviting participants to participate were sent individually to each participant to ensure anonymity.

***b. Instrumentation***

The researcher used a semi-structured interview approach; Each question was in an open-ended format with no scenarios involved. The interview questions for senior officers were less structured, and they aimed to engage them to share their experience, reaction, and support to the CoP model in the NAVRESFORCOM. Most of the questions were not geared toward how the participants perceive their own situation. However, while conducting the interview, especially with the FTS-IT participants, some started to perceive their career development experience. The interviewees were informed that no PII or personnel records should be shared or used by the researcher in these interviews.

**2. Data Analysis Approach**

As indicated earlier in this thesis, except for one respondent selected to respond via email, several virtual platforms were used to facilitate face-to-face interviews. Despite the pre-structured interview questions, the questions were communicated conversationally to encourage participants to respond openly to questions. The interviews were recorded and safeguarded to protect the participants' privacy; furthermore, MS Teams, Zoom, and email responses converted the interviews' dialogue into written records of the interviews for further analysis. Although the participants were not required to share any examples from practice, they provided new data invaluable to the research.

One of the challenges of conducting a qualitative interview is collecting a voluminous amount of data. For example, the researcher has more than 16 hours of interviews; each of these interviews averaged 6,000 to 8,000 words. Moreover, participants used terminologies and professional jargon understood by the researcher, but they were not as clear to zoom or MS Teams auto-transcription. In the qualitative data collection and analysis, the researcher relied on non-traditional Computer Assisted Qualitative Data Analysis Software (CAQDAS); the CAQDAS methods selected were the MS OneNote to facilitate the coding process data collected. However, this methodology is not unusual in qualitative research as other qualitative researchers have used it (Femandes et al., 2015). The coding of data relied mainly on the research questions; therefore, during the analysis phase, the researcher used this categorization to navigate and group participants' responses.

In Table 5, the researcher shows the nexus between the research questions and the area covered in the CoP model.

Table 5. The Relationship between Research Questions, CoP Areas, and Interview Questions

Research Questions	CoP area(s)	Interview Questions (Reasoning / Interview Q. Numbers)
<b>1. How could a CoP enable knowledge sharing, as an aspect of knowledge management, in the NR-IT community (FTS-IT)?</b>	<ul style="list-style-type: none"> <li>- Org. Membership</li> <li>- Talent Management</li> <li>- Community Coordination</li> <li>- Mentorship</li> </ul>	<p><u>Reasoning:</u></p> <ul style="list-style-type: none"> <li>- Jr. officers of HROC/ FT-IT (<i>Grp 1</i>) presented views about current KM status and expectation of CoP in helping in collaboration.</li> <li>- Sr. personnel shared (<i>Grp 2</i>) view about the strategic role of CoP in KM, data science, and project management.</li> <li>- Officers from other communities (<i>Grp 3</i>), with IT focus, offered KM examples and collaboration from their communities.</li> </ul> <p><u>Interview Questions Categories:</u></p> <p><i>Cat i:</i> 3, 4, 5</p> <p><i>Cat ii:</i> 4, 5, 7, 8, 14, 15, 18</p> <p><i>Cat iii:</i> 4, 5</p> <p><i>Cat iv:</i> 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17, 18</p>

Research Questions	CoP area(s)	Interview Questions (Reasoning / Interview Q. Numbers)
<b>2. How could a focused CoP framework enable learning in the FTS-IT?</b>	<ul style="list-style-type: none"> <li>- Org. Membership</li> <li>- Talent Management</li> <li>- Community Coordination</li> <li>- Mentorship</li> <li>- Self-efficacy</li> </ul>	<p><u>Reasoning:</u></p> <ul style="list-style-type: none"> <li>- Grp 1 offered views about their need for guidelines for learning expectations</li> <li>- Grp 2 offered views about the current learning structure and future implementations to match USN strategic objectives</li> <li>- Grp 3 shared their own experience and examples from their communities</li> </ul> <p><u>Interview Questions:</u></p> <p>Cat ii: 9, 10, 11, 12, 18</p> <p>Cat iii: 4, 5</p> <p>Cat iv: 4, 9, 10, 11, 12</p>
<b>3. How could a CoP framework enable training and collaboration in the FTS-IT?</b>	<ul style="list-style-type: none"> <li>- Org. Membership</li> <li>- Talent Management</li> <li>- Community Coordination</li> <li>- Mentorship</li> <li>- Self-efficacy</li> </ul>	<p><u>Reasoning:</u>- Grp 1 offered views about the current IT Training and certification process.- Grp 2 discussed and offered views about the expectation of the FTS future training to respond to new issues and challenges- Grp 3 offered their own experience with IT training evolutions and presented examples from their own communities.</p> <p><u>Interview Questions Categories:</u></p> <p>Cat ii: 6, 9, 10, 11, 12, 13, 18</p> <p>Cat iii: 4, 5</p> <p>Cat iv: 4, 13</p>

Research Questions	CoP area(s)	Interview Questions (Reasoning / Interview Q. Numbers)
<b>4. What is an implementation plan for FTS-IT CoP?</b>	<ul style="list-style-type: none"> <li>- Org. Membership</li> <li>- Talent Management</li> <li>- Community Coordination</li> <li>- Mentorship</li> <li>- Self-efficacy</li> <li>- Social Engagement</li> </ul>	<p><u>Reasoning:</u></p> <ul style="list-style-type: none"> <li>- Grp 1 provided insights on their expectation from CoP supporting their career development, training, mentorship, and social interactions</li> <li>- Grp 2 interviews played a significant role in answering this question. Furthermore, it paved the road into post thesis implementation.</li> </ul> <p><u>Interview Questions Categories:</u></p> <p><i>Cat ii:</i> 4,5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18</p> <p><i>Cat iii:</i> 4, 5</p> <p><i>Cat iv:</i> 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18</p>

**NOTES:**

1. for the questions indicated in this table, please see Appendix E.
2. Definitions for terms used in Table 5: Cat i: General questions, Cat ii: questions to HR Jr. officers, Cat iii: Senior personnel, and Cat iv: questions to officers from other communities (wit IT focus)

The basis for the data interviews, data collections and analysis, and the data coding used in this qualitative study is based on the constant comparative method, such a method “combines systematic data collection, coding, and analysis with theoretical sampling” (Conrad et al., 1993, p. 280). The researcher integrated this method into all phases of this study. Therefore, Table 5 is used for the analysis phase, where the researcher uses it to formulate his findings based on the interviews. For example, this table served as an indexing method instead of going through the entire interview by each participant to retrieve their reactions related to specific CoP areas or a research question.

### C. LIMITATIONS

Some of the interactive interviews are beyond the scope of this study. For example, the researcher did not analyze responses related to community realignment, type of



certifications for FTS-IT officers, and the detail about which learning methods or programs should be selected. These issues are essential; however, these should be addressed in the implementation phase of the FTS-IT CoP. Moreover, the researcher applied some level of scrutinization for responses that gear toward generalization. The researcher refrained from asking or seeking information that compromises the participants' privacy. Therefore, some critical information may be eliminated.

#### **D. CHAPTER SUMMARY**

This qualitative case study followed a systematic data collection approach and data analysis based on the constant comparative methodology. The researcher used semi-structured interviews; thus, he applied a conversational style, which encouraged the participants to communicate freely and openly. Due to the participants' various backgrounds, the researcher categorized the questions into four categories to match the level of expertise and the future contribution to the FTS-IT CoP. The researcher used a purposive sampling methodology to select the participants (n=18). This sample of 18 participants produced more than 16 hours of verbal communications and further content analysis recommendations for future reviews. Due to the voluminous qualitative data needed to be examined, the researcher used MS OneNote as a Computer Assisted Qualitative Data Analysis Software (CAQDAS); he further used tables and other means to establish data triangulation.

## **IV. ANALYSIS AND FINDINGS**

### **A. INTRODUCTION**

#### **1. Significance of the Study**

The FTS-IT presents a compelling business model that embraces the idea of managing the Naval Network through the application of project management methodologies. Based on the researcher's observation and the interviews conducted with FTS-IT, it is clear that the FTS-IT professionals hold a high standard of professionalism and autonomy. However, these professionals still rely on the tacit knowledge of other senior officers. This study should help establish a CoP to harness knowledge and attract talented professionals to join the community. Moreover, implementing this study in practice should embrace mentoring, social networking, training, and educational planning of the FTS-IT CoP members.

Thus, the findings of this study will provide the following framework for the FTS-IT CoP:

1. Manage the community knowledge and experience to encourage a systematic development of the members. Moreover, ensure having a solid knowledge base.
2. Provide a platform for recruiting, training, and communication with community experts.
3. Manage the officers' education and training through established guidelines that lead to being ready for more challenging billets and leadership roles.
4. Provide the FTS-IT community with a social networking platform.

The FTS-IT community primarily manages IT billets in the NAVRESFORCOM commands; FTS-HR officers fill most of these billets. The officers must maintain the training, specialization, and certification dictated by the DOD Cyber Workforce directives and regulations. This qualitative case study will lead to the implementation of the FTS-IT CoP, which will become a common platform that enhances the skills, knowledge,

collaboration, training, and development of the FTS-IT community members. Because this qualitative study is exploratory in its nature, there is no generalizability of the concepts or the findings included in this study (Creswell et al., 2007); this study can open the door for further research into a more inclusive and comprehensive community at the DOD level for all Cyber-workforce members.

## **B. THE ANALYSIS PROCESS**

The constant comparative approach, which the researcher selected in the formation and analysis of the qualitative data, required an integrated and systematic data collection and analysis throughout the entire research process (Conrad et al., 1993). Therefore, the researcher built a dynamic structure incorporated in each stage of data collection, literature and theoretical analysis, and evaluation of stakeholders and participants (see Figure 7).



Figure 7. The Dynamic Structure of the Analysis Used throughout this Study

## C. FINDINGS

In the findings, the researcher uses quotes from the participants' responses to lend their views and professional experience regarding KM, collaboration, training, and career developments; these views provide the foundation for creating a robust FTS-IT CoP. For consistency and to maintain the participants' anonymity, the researcher uses "P + number" to identify a participant. For example, the researcher uses *P1*, *P2*, *P3*, etc., for any statement presented by the participants. Table 6 lists the participants' numbers, military or civilian level, and their professional background. The FTS-IT is a small community; therefore, only the items listed above are included in the table to maintain the participants' anonymity.

Table 6. List of Participants Interviewed in this Study

Participant Number	Career Ranking	Professional Background
01	O5-O6- or Sr. Civ	HR-IT
02	O5-O6- or Sr. Civ	HR Non-IT
03	O5-O6- or Sr. Civ	HR-IT
04	O5-O6- or Sr. Civ	HR-IT
05	O5-O6- or Sr. Civ	HR-IT
06	O5-O6- or Sr. Civ	HR Non-IT
07	O5-O6- or Sr. Civ	IT
08	O1-04	HR-IT
09	O1-04	HR-IT
10	O1-04	HR-IT
11	O1-04	HR-IT
12	O1-04	HR-IT
13	O1-04	IPO
14	O1-04	IPO
15	O1-04	IPO
16	O1-04	HAO
17	O1-04	HAO
18	O1-04	LOG-IT

NOTES: 1. The list of participants did not include names and exact ranks to maintain participants' anonymity.

2. HR-IT means HR officers with an IT subspecialty; IPO means Information Professional Officer.

The researcher used Zoom and MS Teams as the means to conduct interviews and extract transcripts. However, the researcher faced a challenge when he attempted to retrieve the Zoom transcripts. In many cases, these transcripts did not reflect what the participants said in their interviews. Therefore, the researcher had to go through the interviews and match the audio with transcripts. Among the reasons for this distortion is the use of military terminology that the Zoom system failed to interpret. For example, an abbreviation such as “*SELRES*” was interpreted by Zoom as *cell raise*. The Zoom transcript also captured other verbal cues and pauses. Because of the researcher’s professional knowledge of the participants’ intents, he selected the proper terms, such as *SELRES* instead *cell raise*, and the unnecessarily overused verbal cues were eliminated, such as the use of “*you know*” when the participant did not use it to inquire on knowledge. Other than these two stated examples, the researcher maintained the integrity of the interviews’ contents.

The findings of this study articulated in four major areas as analyzed in this chapter: 1. FTS-IT CoP, KM, and collaboration; 2. FTS-IT Learning; 3. Community Training; and, 4. The implementation of FTS-IT CoP. Furthermore, the data collected from participants support the findings. During all phases of the data collection and analysis, the researcher triangulates data with the theoretical foundations driven from literature.

### **1. Knowledge Management and Collaboration**

In evaluating the use of CoP to create and codify knowledge on the strategic level and establish a system of sharing knowledge from the top-down and vice-versa in the FTS-IT organization, *PI* stated:

Twenty-three plus assignments that we have that are business systems related. How do we incorporate that concept to ensure they have career progression and are able to have an opportunity for the next pay grade with the right skill sets still developing the right depth, breadth, responsibility, and reserve management? (November 3, 2020).

This statement of *PI* reflected other views of the senior leadership of the community who agreed that CoP would provide an efficient way to capture knowledge and help FTS-IT officers to accomplish their career requirements and better serve the USN and

the NAVRESFORCOM. *P1*'s statement demonstrates the complexity of the type of knowledge and assignments the FTS-IT members assume during their career.

When the participants asked about the current knowledge management and collaboration in the FTS-IT community, all participants agreed that they could use a unified knowledge base. Currently, the knowledge has been transferring in tacit and more informal methods. Some of the respondents expressed that based on the earlier discussions when they joined the FTS-HR community, they were motivated to think that the HR community has an IT career path. However, no career progression roadmap was established to validate their assumptions of being locked in an IT track. Moreover, with the absence of a knowledge base, some respondents were struggling in planning their IT career. For example, *P8* expressed the thought process of selecting specific certifications or billets: "... I did it in hopes when the Promotion Board came around, they see more of breadth versus depth, to show that I went outside the IT scope and that I was able to do a manpower job" (October 02, 2020). *P8* voiced concerns about the right plan for career development: "Obviously, the answer is to do it all." *P8* was referring to the choices that had to be made, whether to temporarily depart the IT career pipeline and assume a manpower assignment.

As expressed by *P8* and repeated by other participants, there is an expectation that commissioned officers must maintain a level of breadth in the knowledge they acquire; therefore, it is crucial to maintain a balance between the required depth and breadth. Indeed, having a knowledge base ensures that the community members understand how much depth and breadth they need to build their expertise based on the billets' requirements. Furthermore, a knowledge base that contains clear career expectations should eliminate the struggle of selecting which career path is appropriate for career development. Currently, there are two ways to find and negotiate for future assignments. According to the participants, first, finding future billets through direct communication with the detailer about future billets; and the second source is by viewing an excel spreadsheet of gapped billets, which is available to the HRCOE site hosted on the NPS Saki portal (see Appendix A). However, there is no IT-focused area on the HRCOE. Therefore, in the absence of explicit knowledge, several participants stated that they relied on tacit knowledge.

When inquired about the contribution a CoP can add to the FTS-IT knowledge base, all participants agreed that it would add value. Moreover, some participants emphasized how a CoP can ease their hardship while allocating knowledge on their own. P3, P11, and P12 shared their experiences about KM and career planning:

**P3** (explaining the situation after selection into the HR-IT community and attending graduate education in IT): I didn't know who the CIO was. I didn't know who the CTO was, and it would have been probably beneficial to me to have that information prior to going out there and even so much to say, '*hey, this is what your thesis ought to be.*' That type of involvement, because again, it was such a small community (December 3, 2020).

**P 11:** I am proud of the HR as a community. We have interesting billets, and we got good strong mentors. But I feel that few of us, HR officers, are doing IT, and we still have no community resources to connect us. We have few senior officers, but they are busy already; it doesn't make sense to call them and get their opinion on small career decisions that can be answered if we have a portal or discussion board. Then senior officers and other junior officers can respond (January 10, 2021).

**P 12:** I think we have very talented people, but they are all over the place as it relates to their skill sets .... [furthermore, the P12 referred to knowledge about career expectation] ... I really don't feel we have a solid solidified structure of how that looks [referring to the HR-IT career]; because we have IT billets that 'are' milestone, but there is no straight path to walk to them (September 22, 2020).

Additionally, P12 gave an example from another HR sub-community: the Financial Management (FM) community. According to the participant, the FM is similar to the HR-IT community; for example, it is a small sub-community with its own subspecialties and an FM track for the NHROC. However, the FM members are part of a bigger DOD FM CoP. According to P12, the FM has a defined career structure.

As the Human Resources Systems is becoming more digitized and relying heavily on technology, participants emphasized maintaining an IT track in the Human Resources Community; for example, P6 stated:

When I think about manpower personnel training and education, and then our subspecialties of Operational Research manpower systems analysis and also information technology, I think information technology is the core competency that we have to align with private and civilian credentials. I think it's essential because we shouldn't be rebuilding platforms that don't

coincide with the technology on the outside and the modernization that's going on. I think it's absolutely critical that our other HR or IP IT professionals are completely aligned, supported, and also rewarded for staying current in the civilian certifications (December 17, 2020).

Despite the small excerpt of the P6 interview, it is an indication of how crucial maintaining an IT track is within the FTS Human Resources community to support the NAVRESFORCOM and the MPT&E technological infrastructure. In an interview with P7, the participant emphasized the role of the 1207-IT in maintaining NAVRESFORCOM infrastructure. Moreover, the participant also emphasized the FTS HR-IT's obligations to maintain their IT certification in addition to the Human Resources certification. This shuffling between multiple careers is needed because of the nature of the roles and billets; however, a CoP will ease capturing and collaborating the needed knowledge.

## **2. FTS-IT Community Learning**

Based on the interviews with participants from different communities, IT officers were selected by their communities to pursue a graduate degree from the U.S. Naval Postgraduate School in Network Operation and Technology. The officers from communities such as IP and Healthcare Administration with an IT track felt that pursuing this degree at NPS is required and could be career-enhancing. However, for HR-IT, there the feeling is not consistent. For example, P12 and P13 felt a degree at NPS helped their understanding of several complicated IT concepts; however, they felt that pursuing a degree for two years at NPS could have a negative impact on their career. Moreover, P8 and P11 stated that they got mixed answers on whether to attend NPS or not. Therefore, some officers decided to pursue their master's in IT or IS while serving on active duty to avoid possible career predicaments.

P1 provided a very thoughtful, strategic view that encapsulates the importance of IT and IS education: "our adversaries become smarter and smarter. We have these other countries like China and Russia that are super smart and have become creative. They're continuing to educate themselves, to ensure they have that leg up" (November 3, 2020). The P1's example about how the adversaries of the United States are expanding their recruiting efforts to retain IT talents within their forces is an indication that the U.S. must



maintain a competitive advantage by educating military professionals, such as the FTS-IT, on IT and cybersecurity.

*P4* stressed the importance of learning about IT analytical methodologies by accumulating knowledge through the officers' career growth; additionally, he stated:

we can't just come up and say, Hey, I've got a great, great idea. Let's support it because if that great idea does not support the overarching strategies, then we're wasting funding resources.... The crux, or the importance, of both the CIO cert and master's paths that I believe many, if not all, 1207 with the IT subspecialties should pursue (December 7, 2020).

*P4* further established a nexus between the level of education, training, and former IT billets and the ability to formulate articulated analysis to stakeholders. In their interviews, *P4*, *P5*, *P10*, and *P13* indicated that learning should match the career level of the IT professionals' roles, which leads to "simplifying and branching out" (*P10*, October 15, 2020) as the IT professionals develop in their careers. For example, as *P4* suggested, senior FTS-IT officers manage large-scale projects and are required to brief flag officers; therefore, they should be learning the tools of the IT professions to present analysis to IT strategies and emerging technology while being fiscally responsible.

### **3. FTS-IT Community Training**

*P1* provided an important view on how a mentorship program should work efficiently. For example, *P1* suggested avoiding having single points of failure by avoiding having only one person, such as the CIO or CTO, as the de-facto mentor of every member in the community. According to *P1*, a good system of mentorship nurtures self-efficacy. For example, "the lieutenants can be mentored by the lieutenant commander and the commanders; the commanders by the O-6's." This hierarchy in mentorship will allow decentralization of mentorship and allow the community to grow without burdening the senior leadership.

Some of the participants voiced concerns about the training, assignments, grooming, and mentoring of IT officers. For example, *P4* stated:

The thought is, hey, I can put any officer in there, and the job will get done. Where the opposing thought is there needs to be a specific track. The

member is still 1207, and there's going to be a requirement to do some other HR billets, but we need to ensure that they fulfill, starting at a junior level, that they start building certain billets so that we can start molding them so that whenever they get to O-5, that we are putting them in positions and they know what they're talking about (December 7, 2020).

The overall concern that *P4* presented in the interview was that FTS-IT, and more specifically HR-IT, sometimes do not provide the career progression path that other communities offer to their members. IT tends to rely on continuous training, certification, and mentoring. A similar view was also presented in an interview with *P10* and *P11*, who suggested that training and mentorship will lead to better managing the NAVRESFORCOM IT infrastructure, integrating with the DOD cyber workforce, and building a career path that helps in managing larger projects at O-4 to O-6 levels.

In inquiring on HR-IT billets, career development as HR officers with IT sub-specialty, and mentorship, many participants admitted that there is a need for structure. For example, *P10* stated: "it almost seems like the CIO, and CTO roles kind of become the overall guardians of this whole community to kind of help give you expectations on" (October 15, 2020). In addition to referring to the force CIO and CTO as the guardian, the participant further suggested that although knowledge is not defined, a checklist can be established by observing other's career paths and billet requirements. Others created similar methods to the checklists as suggested by other participants; however, these methods were not always successful, as indicated in the interviews.

The response of *P10* was similar to other officers in the HR-IT who relied on tacit knowledge and interaction with the community upper echelon. Though *P10* referred to this process as a checklist, no official checklist of qualifications exists. As indicated before, it appears that such a method is an individual effort to keep them on track in the absence of an established career pipeline. The concern expressed is the need for mentorship to prioritize which item in this list comes first. From the participants' interviews, it was clear that tacit knowledge is the main delivery mechanism for knowledge of the FTS-IT. Currently, there is no knowledge base to use for collaboration or knowledge sharing. Therefore, knowledge is shared based on verbal communications either with senior officers or other peers. The common response of the participants indicated that they do not have

mentors with HR-IT backgrounds; in some cases, the members reach out to mentors from other commissioned officers' communities.

#### **4. The Implementation of the FTS-IT Community of Practice**

The researcher asked the FTS-IT participants whether a CoP can help the FTS-IT community; all participants agreed that a CoP would be useful in KM, collaboration, and career development, including training and networking efforts. *P1* suggested that a CoP would be beneficial for officers' careers; the participants also elaborated in the interview on the importance of mentoring. Additionally, *P1* stressed the importance of using technology as a platform for the future FTS-IT CoP, such as SharePoint. The participant also gave an example of Financial Management as a good example of such a small sub-community of HR and a good model of CoP.

At least on three occasions, including interviews with participants, it was brought to the researcher's attention that the IP community will be authorized to start an FTS community (FTS-IP). Furthermore, it is expected that all the current FTS-IT billets and personnel will merge into this new community. Participants had different reactions to this merger; however, some thought that the FTS-IT CoP would play an important role in this transition if such transition took place. For example, *P1* advised that the FTS-IT need to start collaborating on the type of knowledge that the FTS-IT community needs to attain if an FTS-IP transition occurs. This transition ought to be smooth; therefore, the CoP should help codify the current state and help smooth integration between the merged communities' members. Therefore, on the strategic level, CoP becomes the tool of integration. Indeed, integration is beyond the scope of this research; however, creating a well-defined knowledge base may become an invaluable source of a smooth transition between these two communities.

*P4* presented another critical aspect of the FTS-IT; he discussed a future plan of establishing the FTS-IP community. This plan may lead to merging some of the HR-IT personnel into this new FTS-IP community. Although, to the best of the researcher's knowledge, this community has not been fully confirmed yet, it is important to present *P4's* views on the distinctive knowledge-bases that HR-IT and IP communities manage:

while there is a lot of opportunity for both the IPs to do the job of the HR with the IT sub-specs, the question that comes into play: It's like, well, who better aligns to do the tasking to support the reserve component and when you look at a lot of our systems. A lot of the IT systems that we 'oversee' and manage they align with the private industry and require a lot more of the certifications and requirements to support those as opposed to what the IP officer does to support the warfighting systems on the ship (December 7, 2020).

The views of *P4* and other participants on the merger issue are important since the FTS-IT CoP will work as the means of collaboration, KM, training, learning, and career development of the current FTS-IT community. Additionally, it should ease the merger process if the IP community acquires NAVRESFORCOM billets and personnel.

Inquiring about the CoP in other IT-related communities, the IPO and HAO members indicated that IT education, such as that offered at NPS, is integrated within the officers' career pipelines. Furthermore, the IPO and HAO participants indicated having mentors from their subspecialties. The IP community maintains a robust CoP site that enables IP officers to access and plan their career development and training requirements.

Additionally, some of the participants explained the unique tasks of FTS-IT. For example, *P9*, comparing IT in the active duty to the FTS: "FTS pretty much focuses on program management of some kind. They don't really get into the cyber warfare piece or the shipboard comms piece, you know, it's all an MCI management program management" (October 8, 2020) Therefore, because of the nature of the tasks and the career milestones, it is important to have an independent CoP for the FTS-IT.

#### **D. DISCUSSION**

The IT leadership and community members at NAVRESFORCOM welcomed the concept of CoP for the community. Many members reiterated that the new CoP, once operational, should assist the FTS-IT community's knowledge management, collaboration, networking, and career development. In this chapter, the researcher explores the participants' reactions based on their responses to the interviews; the overall findings show that a CoP will benefit the FTS-IT community. The following discussion analyzes the theoretical basis of implementing FTS-IT CoP. Thus, in addition to the participants'

reactions, the drivers of this discussion are the initial research questions, the participants' responses, and theories that support CoP.

### **1. Promoting Knowledge Management and Mitigating Organizational Memory Loss**

Among the concepts that a CoP nurtures is the concept of managing organizational knowledge and capturing the experience of the organization's members; therefore, the skills attained by its members do not get lost (Erik-Andriessen, 2005). Additionally, having no systematic way of capturing the knowledge of the community while its members are departing their posts for regular rotations or retirement, the organizational memory is in danger of decay over time; furthermore, knowledge has a life span, in which it is born, lives, and may eventually die (Casey & Olivera, 2011; Housel and Bell, 2001). Therefore, it is essential not to take knowledge for granted and establish a system to facilitate the growth of organizational knowledge.

Based on the interviews conducted in this study, officers at the paygrade of O-5 and below inferred that the source of the FTS-IT community knowledge is at the CTO and CIO level. When asked about how they plan their career or determine what training or education to pursue, participants, implicitly or explicitly, referred to the NAVRESFORCOM CIO or CTO. This response indicates a risk of knowledge decaying, especially with the increase of force modernization and emerging technology. The reliance solely on the upper echelon to provide guidance creates singular points of failure in knowledge flow.

Although knowledge management is one of the essential elements of CoP, the latter is different from a mere community of knowledge (Smith, Hayes, and Shea, 2017). Smith, Hayes, and Shea suggest that a CoP is an overarching framework supported by a knowledge-sharing platform. Therefore, the knowledge of the CoP should be purposeful and rotate on the needs of the community members. For example, the FTS-IT CoP should have knowledge related to career development, education, community rosters, and other information that enables the community members to make a decision efficiently.

The participants, O-4 and below, reported that they had to rely on the senior leadership's tacit knowledge and philosophy. Some participants stated that they had

consulted many resources to be able to formulate career decisions and billet choices. Furthermore, the participants inferred that the knowledge is scattered, even for the NHROC portal hosted on the Naval Postgraduate School, which is geared to the general community of NHRO; there is nothing pertaining to the IT career pipeline.

A thriving knowledge base should ensure a process of push-pull knowledge using a method of “partnership between human cognition and machine-based intelligence” (Housel & Bell, 2001, p. 4). Therefore, the suggested model adopted in this study will follow at minimum the core component of this knowledge-spawning mechanism or categories: “label knowledge,” “process knowledge,” “skill knowledge,” and “people knowledge” (pp. 11–12). The researcher discusses this categorization in more depth in the implementation consideration, Chapter 5 of this study. In building a model of the knowledge base for the FTS-IT community, the goal of establishing a model based on these four categories is to achieve what Stein (2005) suggested: having a group of professionals that are capable of creating a collaborative platform in a self-evolving mechanism.

To connect the theoretical framework and data collected from participants, the researcher recalls how several senior officers stated in the interviews that they wish that junior officers could attain a commanding knowledge of project management and project management certifications. However, there is no official literature explicitly stated or publicized among HR-IT or FTS-IT. Currently, the literature indicates the following certifications as recognized by the NHROC: GSLC, CISSP, and PHR or SPHR. Indeed, the NHROC literature indicates other certificates; however, these are the professional certifications that an HR-IT officer seeks to satisfy the requirements imposed by the DOD cyber workforce and NHROC.

## **2. Enabling Learning through a Focused CoP Framework**

Hoadley (2012) suggests that learning is a way of participation in CoP; a learner enters into a particular community and gradually adapts to the CoP practices. Furthermore, the learning occurs by having access to community experts in order to gradually adapt to the practices of the community. Additionally, Hoadley and Kilner (2005) suggested that both learning and knowledge “exist as byproducts of social process” (p. 31). Therefore, as

a community, a CoP accumulates knowledge as its members collaborate; however, this community knowledge is accumulated through different learning mechanisms. Additionally, CoP should evolve from the social nature of learning (Wenger, 2010). An implementation of a method that encourages the community to establish a shared learning framework should lead to creating a unique identity of the community.

In triangulating between theory and data collected from participants, the researcher observes the nexus between learning and CoP. At least three participants mentioned Financial Management (FM) as a community with unique characteristics. The overarching CoP for the FM community is an organization that includes all DOD financial management professionals. This organization, as an example, is the American Society of Military Comptrollers (ASMC). Despite the difference between the ASMC and the NHROC Financial Management, the participants had a sense of what a CoP should do to support the community members. The ASMC has established comprehensive training, career development, and certification, leading to tailor learning to fulfill the FM community guideline. This is the direction that participants appear to call to adopt in the future FTS-IT. In this qualitative study, the voice of the participants played a significant role in the proposed model.

Social learning theory suggests that learning in a community occurs by incorporating four elements: the trainer, the learners, the environment, and self-efficacy (Bandura, 1971, 1977, 2006). FTS-IT members varied in their skillsets, as P12 stated in the interview. Moreover, in some cases, they supervise individuals with minimum IT knowledge at the lower echelons, as indicated by P11. Therefore, there should be a defined learning continuum to ensure that the community members share the minimum required learning baseline.

### **3. Establishing a Focused Implementation Plan**

Chapter V of this study discusses in more detail how the proposed model of FTS-IT can be implemented. In Chapter IV, the focus is on the theoretical framework and the data analysis. In a geographically scattered community, such as the FTS-IT community, using a technology-based platform, such as an online portal, is an essential method to

keeping the CoP members connected (Russell, Parker, Bolden, & Sherman, 2011). Technology has been an important tool used by most of the contemporary models of CoPs.

The participants gave examples of technology-based CoP as a way to show their expectation for a future FTS-IT CoP, such as the example of ASMC. Moreover, the participants from the IP and Health Administration communities provided the researcher samples of how their communities interact and collaborate. Both models showed reliance on the technological foundation of hosting their CoPs.

## **E. CHAPTER SUMMARY**

This chapter presented the findings based on the interviews conducted with participants ranging in military paygrade O-2 to O-6 and civil-service seniority level at or above GS-13. All participants from the FTS-IT community agreed that a CoP would greatly contribute to the FTS-IT community members. The other officers who are members of other communities with primary IT roles, such as the IP community or IT subspecialties, such as HAO, helped present a comparative model used in their communities, which was a significant addition to these findings and future implementations.

Several participants suggested that FTS-IT should be mirroring the HR-FM community, and after conducting a review of the FM community, the researcher decided to include a thorough comparative analysis of the HR-FM communities. The FM community in HR has a solid career pipeline because it adheres to strict DOD guidelines; these guidelines are governed and maintained through a rigorous oversight process. Future research may be conducted on establishing an IT or cyber workforce CoP at the DOD level.

The participants of the HR-IT community who consistently filled at least 18–24 billets under the NAVRESFORCOM understood that they need to mix between HR and IT billets. The consensus is to alternate between the HR and IT for the HR-IT officers while maintaining IT career progression. The interviews indicated that one of the biggest concerns voiced was to place officers in leadership roles without career evolution in IT career pipelines.



The senior members of the FTS-IT community signify the importance of aligning career levels and the skills needed to achieve them instead of just placing officers without the right skillsets and progressions in the IT pipeline. The senior leadership of the NAVRESFORCOM showed support to the FTS-IT community. The junior officers agree that FTS-IT will help them allocate knowledge more easily, collaborate more efficiently, become more effective professionals and leaders, and have the right means for networking and mentoring within the community.

## **V. FUTURE IMPLEMENTATION CONSIDERATION**

### **A. CHARACTERIZATION OF THE PROPOSED MODEL**

The virtual design of the FTS-IT CoP platform is the foundation of the CoP presence and engagement. Although there is no complete departure from physical interaction, technology is the best method to connect community members who are not geographically collocated (Russell et al., 2011). Additionally, Housel and Bell (2002) suggested that reliance on IT is essential in preserving the organizational knowledge if employees depart the organizations. Therefore, technology is essential in building an FTS-IT CoP because the members are serving in billets scattered throughout the United States and possibly over global theaters. There is a risk of the organization's memory loss due to the members' periodical rotations. In this study, the assumption is to build a model with multiple attributes related to two main categories: organizational and strategic. Table 7 indicates a set of attributes at the strategic level and another set of attributes at the organizational level. The researcher will emphasize the concepts included in this table later in this chapter.

Table 7. Characterization of the Proposed FTS-IT CoP

Attributes	Characterization
<b>I. Strategic Level</b>	
<u><i>a. CoP Scope</i></u>	Collaboration, mentoring, learning, training, and career development
<u><i>b. Knowledge Management</i></u>  Labels and Language Process and Standardization  Ready Relevant Skillset  People Knowledge	Present Navy and IT jargons and terminologies Assist members understand the IT process  Push-pull knowledge to determine the needed skillsets of each billet  Community members, other communities, sponsors, and stakeholders
<u><i>c. Learning and Training</i></u>  Skillset Driven Learning  Job Requirement and Training	Community-based initiatives to match the echelon level with the right needed learning  Training Continuum that matches the job requirement
<u><i>d. Embrace Technology</i></u>  Web-based portal  Smartphone/ Tablets compatibility  Reliable Virtual Conferencing	Use a web platform to stay connected  Use approved apps and other features for smartphone/ tablets  Ensure having access to a reliable and secure virtual conferencing
<b>II. Organizational Level</b>	
Mentoring  Professional Networking  Social Networking  Regional executive Boards (Chapters)	Encourage mid and senior-level leadership to mentor other members Encourage members to connect and discuss professional issues (e.g., via discussion boards) Encourage social networking among the members (e.g., community events and sports) Voice of the customers, regional and local agendas. Liaison (leadership-members)

## **1. Strategic Level Attributes**

### ***a. Scope***

The scope of this study is limited to implementing a CoP for the FTS-IT community to achieve knowledge management, develop learning and training structure, establish collaboration means, and assist the members with their career development and planning.

### ***a. Knowledge and Collaboration***

As stated in Chapter 4, the researcher adopted the categorization of the knowledge spawning concept presented by Housel and Bell (2001). Military personnel tend to be accustomed to structured behavior; therefore, a successful knowledge model should be systematic.

#### **(1) Label Knowledge**

One of the challenges facing FTS-IT members who newly enter into managing IT projects in the USN and the NAVRESFORCOM is acclimating themselves with a massive number of new jargon and terminologies. Depending on the level of managing IT infrastructure, the use of different terminologies overwhelms newcomers into the FTS-IT regardless of their prior IT and IS knowledge. To establish an FTS-IT CoP, it is vital to create a clear path to label knowledge.

#### **(2) Process Knowledge**

Currently, such knowledge is established via on-job training, scattered training materials, and tacit knowledge. These methods are important in transferring process knowledge; however, all these processes occur at the local levels most of the time. In a CoP setup, the process knowledge should occur on all levels, including a virtual delivery method. IT and IS are volatile fields with many emerging technologies, cyber threats, and business applications. Therefore, process knowledge should include a feature that enables managing this process at a centralized level; the proposed FTS-IT CoP can offer this option.

(3) Skill Knowledge

Interviews showed the importance of driving the FTS-IT into pursuing project management skills. Having the professional knowledge of IT, IS, and cyber is essential; however, project management distinguishes the FTS-IT from the IT management on the active-duty component. In addition to managing IT infrastructure, the FTS-IT must manage the readiness and the mobilization of the reserve force in support of the fleet and joint operations. Building a clear skillsets structure that encompasses IT, project management, IS, and reserve force management should be included in a CoP knowledge base.

(4) People Knowledge

In building the FTS-IT CoP, *people* should be one of the most critical elements. Ultimately, the main reason a CoP exists is to connect people, the members of the CoP. Knowledge is created by people and for people. Therefore, culture, gender, and other stakeholders may have to be considered when knowledge in an organization is being created.

***b. Learning and Training***

In the USN and DOD, there are excellent graduate-level educational institutions designated for commissioned officers who are senior O-2 to junior O-5; these institutes help officers with the subsequent career assignments. The interviews gave examples of the U.S. Naval Postgraduate School and the National Defense University (NDU). However, as some of the participants stated, there is no community support in finding ideas for research topics for their thesis to help the community or the NAVRESFORCOM. At least two participants indicated that they had to reach out to headquarters to offer guidance to the community.

In the proposed FTS-IT model, the community leaders should establish communication channels with the research offices at learning institutions, such as NPS and NDU. Officers who attend these institutions should use the CoP to find mentors who completed these programs for guidance.

Additionally, the CoP itself should become a medium to deliver training and learning. Therefore, technology should allow the integration of virtual and physical learning and training plans. For example, an integration of an online Learning Management System such as Sakai software can serve the FTS-IT as the NHROC, and other communities use this method. The implementation model of the FTS-IT uses the Sakai platform as the means of developing learning and training models for the FTS-IT communities.

***c. Technology-Driven CoP***

The literature and the researcher's investigation of other successful models of a CoP indicate that technology is an essential factor to the success of a CoP (Hoadley, 2012; Russell, Parker, Bolden, & Sherman, 2011; Stein, 2005). Although this study does not provide a total comprehensive structure of the FTS-IT CoP, it provides the basic framework, including an online site template ready for full implementation.

***d. Final Thoughts on the Strategic Level***

The leadership of the community is the main driving force of the strategic level. Although the researcher discusses a model of the push-pull relationship between the leadership at the strategic level and the members at the organization level, the literature suggests that a successful model should be embraced and supervised by the leadership (Wenger et al., 2002). Having this overall supervision does not negate encouraging community self-efficacy. In the platform design, the researcher emphasizes how the model achieves equilibrium between the two levels of the organizational structure of the CoP. Thus, the active leadership role in the CoP validates the existence of the CoP, and it leads to the community being better connected.

**2. Organizational Level Attributes**

***a. Mentorship***

Several participants of the FTS-IT community indicated that every member in the community currently looks up to the CIO and CTO as the de-facto mentor. However, when there is no access to the CIO or the CTO, the officers go outside of the community to seek

guidance or attempt to evaluate the worst-best case scenarios independently. This study creates a mentorship model that ensures that mid-level to senior-level management (O-4, O-5, O-6, and GS-13 and above) are mentoring other FTS-IT community members.

***b. Professional and Social Networking***

Although this study assigned a special consideration to knowledge, learning, and training, these three elements do not flourish in a vacuum. The theoretical literature suggests that knowledge and learning manifest in a social structure that nurtures it (Bandura, 1971, 2006; Hoadley & Kilner, 2005). Therefore, the implementation of the CoP model ensures having a platform for networking among the FTS-IT members. The community should take advantage of professional and social networking methodologies, such as Linked-in and Facebook. Figure 8 shows an example of a professional network model.

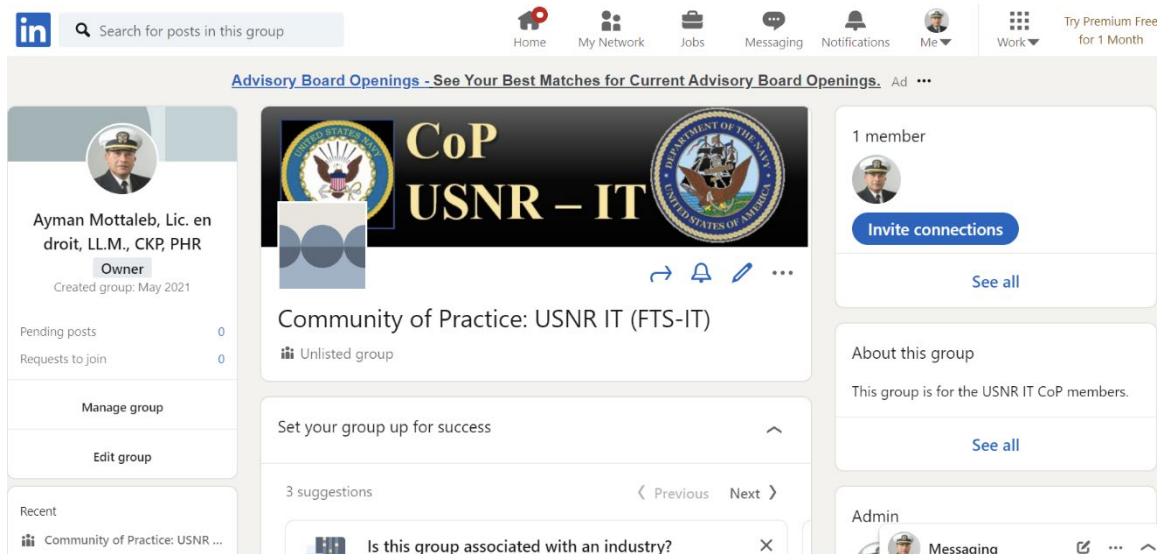


Figure 8. The FTS-IT Proposed Professional Networking Site on Linked-In

***c. Regional Executive Boards (Chapters)***

As indicated in Figure 1 earlier in this study, the NAVRESFORCOM is divided into six regional commands, known as the RCC; in case of growth of the FTS-IT

community, establishing a layer of regional chapters should be implemented. This study will not include creating this level at this phase of the creation of the CoP.

*d. Final Thoughts on Organization Level Attributes*

Despite presenting the strategic and organization levels separately, it is essential not to treat these two categorizations as separate silos. In the platform design section of this study, the researcher introduces overlapping functions in the Venn diagram in Figure 9. Therefore, building a successfully robust FTS-IT CoP needs to have roles for each level of the community stakeholders, yet invoking a level of self-efficacy of the community members is essential to the continuation of the CoP.

**B. CONNECTING THE DOTS: PLATFORM DESIGN**

The CoP platform as presented in this study might look complicated because of the complexity of the FTS-IT community structure. However, the use of technology should ease the dynamic integration of this model. This technology-driven model should be hosted on one of the DOD or Navy platforms, such as MS SharePoint. Currently, at the request of the researcher, the NAVRESFORCOM CTO office approved a site for the FTS-IT CoP. The elements of this design should be divided into two categories: first, the main segment, which is open to anyone with a Common Access Card (CAC), Second, the second segment with site permission geared to the FTS-IT members only. The first segment, which is open to any member of the NAVRESFORCOM, offers the community the ability to interact with other stockholders.

However, the second segment has an offshoot level of permission and is designated only for the FTS-IT community member. Therefore, the second segment implements the two-level structure stated in Table 7. The ultimate goal of this structure is to achieve a push-pull relationship between the leadership and the community members (Figure 8). In this chapter, the researcher analyzes in more detail how this model meets the FTS-IT need for KM, learning, training, and career development.



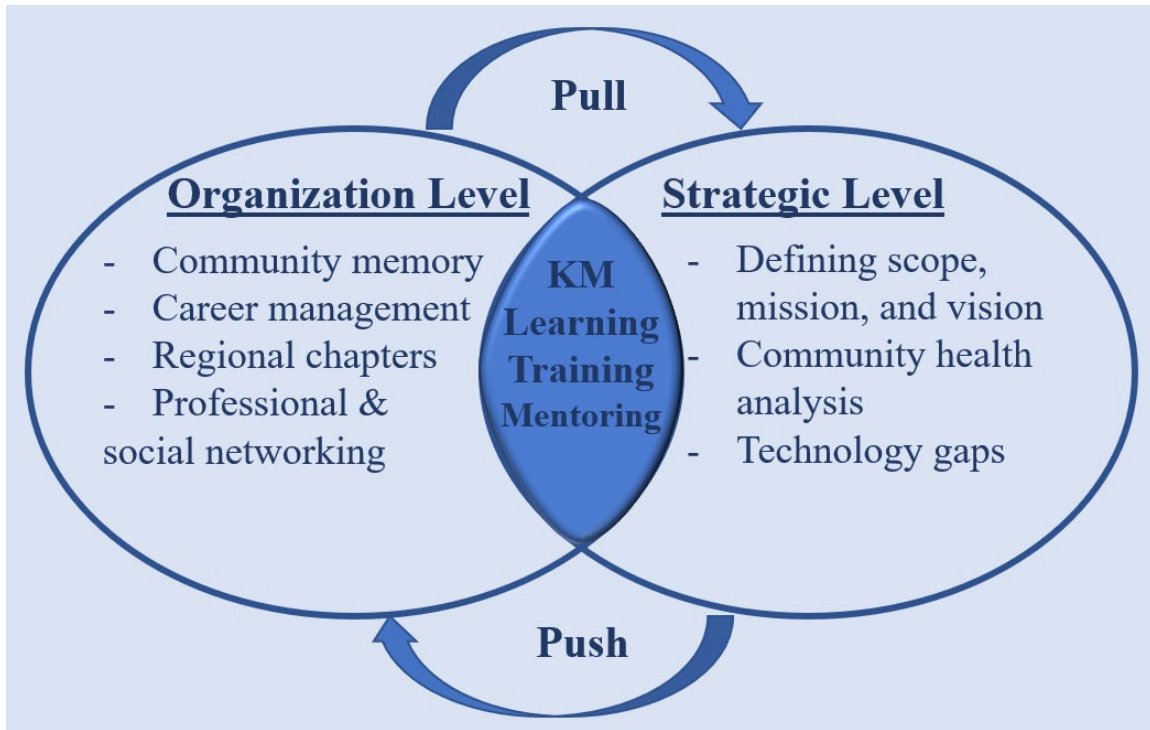


Figure 9. The FTS-IT Overall Design: Dynamic Relationship between the Strategic and the Organizational Levels of the FTS-IT CoP

### 1. The CoP Site Structure:

With the expansion of computer reliance on the virtual domains, there is an increase of dependency on the virtual environment; this new trend changed the methods of interactions and communication among communities' members (Akoumianakis, 2009). Therefore, the implementation of the FTS-IT portal must maintain fluid and dynamic characteristics to facilitate connection among the members. The main site for the FTS-IT is hosted on the NAVRESFORCOM portal, which is known as *My Navy Reserve Homeport*. Appendix G shows the proposed timeline and the stages of the creation of this FTS-IT CoP. The learning, mentoring, and training are administered using Sakai Learning Management System (LMS). This LMS is hosted on the NPS domain. The permissions are set to limit access to the administrators and the community members.

**a. Main Page (Landing Page)**

The main page serves as the one-stop access to the FTS-IT community. The main page is open for everyone who has CAC access; however, a link is available to allow members to access the *community members-only area*. Figure 9 shows a screenshot of these features.



Figure 10. The Top Navigation Bar of the FTS-IT CoP Site on My Navy Reserve Homeport

As shown in Figure 9, the members can log in to the members-only areas; moreover, they can select other options.

**b. Networking**

According to Wenger et al. (2002), “a more developed community could improve upon their current personal networks or help them leverage dormant capabilities” (p. 54). As the CoP embraces self-efficacy among members, mature professional and social networking should help the members use personal networks to enrich professional skills and capabilities.

Professional networking should take place through attending different functions together. For example, the NHROC has an annual training and professional event. This event is known as HR Professional Development Training Course (HRPDTC). The FTS-IT community should have a breakout session dedicated to training and updates on the FTS-IT issues and concerns.

**c. Training and Learning**

The main site of the community will include highlights for training and learning needed to sharpen the FTS-IT professionals’ skills and capabilities. However, the actual training and learning events will be posted and managed on the FTS-IT CoP hosted by NPS on the Sakai LMS, as indicated in Figure 10.

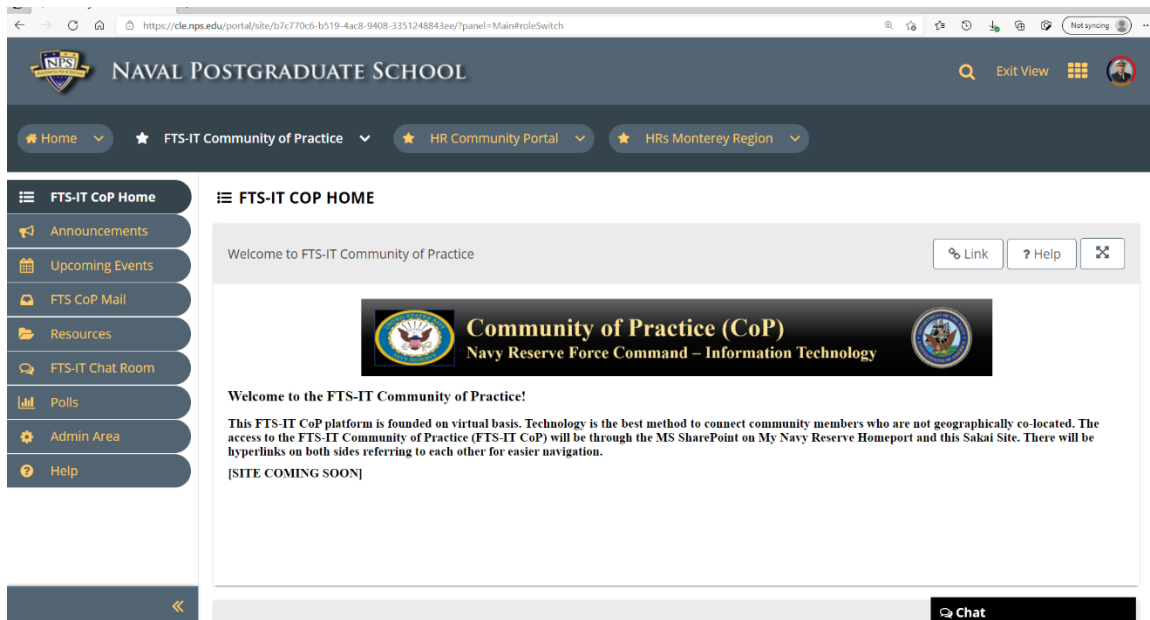


Figure 11. FTS-IT CoP Site on NPS Sakai LMS Dedicated to the community Learning and Training

Mentoring is the natural evolution of a community to preserve and develop the skills of the community members; however, as Wenger et al. (2002) suggested, the mentorship must be conducted systematically, especially for mentoring newcomers into the community. The CoP mentorship should be hosted under the main site. A dedicated subsite or an area that allows mentors and mentees to communicate and collaborate should be established.

***d. Supporting N-6 Departments at the NAVRESFORCOM Regions***

At the RCC level, the department head of Information Technology manages a large region. Often, the department heads tend to face many challenges; the CoP should help the department heads manage the emerging challenges in the regions. The CoP main site should maintain enough resources to assist the directors of the IT departments at the regions of NAVRESFORCOM.

***e. FTS-IT CoP Leaders***

Community leadership is invaluable to the success of the community and the development of the members. The top level of the leadership of the CoP community is the

Force CIO; however, the CTO plays a significant role in the community leadership. Between both of them, junior officers should be able to gain perspective on selecting future projects and career paths (Wenger et al., 2002). The advantage of CoP that it should allow the community leaders to delegate spearheading tasks that lead to community efficacy and avoid leaders' burnout.

The community leaders will have a chance to stay connected with the community members via the FTS-IT site through a dedicated discussion board for the CIO and CTO.

## **2. Moving Forward with FTS-IT**

The FTS-IT community has accepted to take the responsibility of IT infrastructure with minimum guidance or clear scope. The community responded to fill a gap and has done an effective job maintaining and managing the NAVRESFORCOM IT infrastructure. Meanwhile, the community also gained the skills, professional certifications, and knowledge; therefore, it is important to preserve the investment of the USN on the gained human capabilities. The CoP, with its virtual mechanism, will ensure the continuation and preservation of knowledge, collaboration, and responsiveness to future challenges.

## **C. CHAPTER SUMMARY**

The implementation of the FTS-IT is supported by virtual infrastructure; the two main platforms were the SharePoint for the main site and the Sakai Learning Management System (LMS). The CoP structure is divided into two main categorizations with specific attributes for each category. These two categorizations were the strategic level and the organizational level. The strategic level includes the community leaders who oversee the overall health of the community and provide guidance. The organizational level includes all members of the community.

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## **VI. SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

For about 15 years, the FTS-IT community developed a high maturity level and self-efficacy. The community started with the efforts of the NHROC to create an IT track to mainly fill more than 20 billets in the NAVRESFORCOM in addition to filling other posts in MPT&E. Recent data obtained by the researcher for this study shows that recently, the HR-IT officers manage 18 of these billets, including the NAVRESFORCOM CIO and Deputy-CIO. This trend shows the wisdom of the USN leadership of maintaining the return on the investment in the HR-IT officers who worked diligently on obtaining the NOBC and professional certifications, including GSLC, PHR, PMP, and Lean Six Sigma. The HR-IT were able to merge their knowledge of IT with modern HR methodology to ensure that a large reserve force is ready to be mobilized on short notice for domestic and global assignments. Having few selected FTS officers from other communities with the right NOBC and skillsets to assume IT billets proved to be enriching to the needed diversity of knowledge and experience.

### **A. SUMMARY**

In general, the IT functions in USN are segmented among different communities, such as the HR, HA, IP, and NAVSUP. This segmentation of IT is needed because each of these communities, collectively, embraces unique requirements that enriched IT and cybersecurity. The IP community is a subcommunity of the naval military intelligence and the Information Dominance Community (USN, n.d.). The HR 1207-IT is a subcommunity of the NHROC; its members are dedicated to maintaining the reserve force's readiness for mobilization and maintaining the IT infrastructure in the NAVRESFORCOM. Meanwhile, the HAO is essential in maintaining BUMED and the Defense Health Agency IT infrastructure and ensuring record integrity. Finally, the NAVSUP LOG-IT ensures that software and hardware contracting matches today's technology and plays an important role in cybersecurity in relation to hardware.

The FTS is the active-duty sub-component of the NAVRESFORCOM, of which the latter is one of the major commands reporting directly to the CNO. As indicated in

Figure 3 of this study, the NAVRESFORCOM has three sub-commands, each with six echelons. The subject of this study pertained only to the commands under the CNRFC, where currently the task of managing the FTS-IT functions is managed. From inception, and due to prior investment in the FTS-IT workforce, most IT billets in NAVRESFORCOM and some billets in BUPERS are filled with HR-IT officers.

The study is designed to deal with four facets: First, support knowledge management between the community members. This aspect aims to preserve the community's accumulated knowledge. Create synchronization among the members of the FTS-IT workforces. The commissioned officers and the civil-service employees are responsible for managing a complex workforce with significantly different skill sets. The FTS-IT CoP aimed to provide support in building a baseline for skillsets based on the members' roles of the members. The study also addressed the lack of a platform dedicated to community collaboration and career development. Finally, in this study, the risk of organizational memory loss was addressed; therefore, the researcher presented a methodology to mitigate such risk.

To accomplish a solution for these four facets, the researcher selected qualitative case study research to investigate whether establishing a CoP leads to invoking a systematic KM methodology, support the FTS-IT career development, and build a training and learning platform. The researcher conducted qualitative interviews with 18 participants with a high level of expertise from several naval communities. The FTS-IT members unanimously agreed that a CoP would be a significant asset to the FTS-IT community members. Therefore, the researcher investigated several models ASMC (n.d.), The American Bar Association (n.d.), Aberdeen Science Centre (n.d.), and other models (Eisenberg, 2018). Therefore, Chapter 5 included an implementation proposal of an FTS-IT CoP model.

## **B. LIMITATIONS AND THE IMPORTANCE OF THE STUDY**

This study represents a single case. Indeed, selecting a single case study creates a limitation on the model's generalizability; however, although the concepts and methodologies used by the researcher in this study can be replicated in other communities

of practice, the goal was to maintain focus on the FTS-IT community. The point of departure of this study was not to establish generalizability; rather, it was to present a model capable of assisting the FTS-IT community to develop a CoP that can embrace the community's efforts in establishing a permanent and reliable system able to facilitate knowledge management, collaboration, training, and career development. Chapter V presented the implementation model of this system. Furthermore, the community leaders are championing this proposed CoP.

Despite this self-declared limitation, this chapter shows how the inductive approach used in this study led to establishing a substantial nexus between theories, research questions, and the participants' responses. Therefore, the significance of this research is founded on the rigors of the research process, the quality of the participants' knowledge, and the actual model that the researcher created and presented in this study.

Additionally, the researcher believes that this exploratory study contributes to the *body of knowledge* in the following manners: first, the study led to developing the first comprehensive model for the FTS-IT CoP. It used an epistemological, inductive process that led to presenting empirical evidence of the status of the FTS-IT community and the need to support this community. Second, the researcher believes that he has used a systematic inductive approach that can be followed by other NPS students at the master's level. Third, based on the theoretical basis and motivated by this study's findings, the researcher formulates a research paper for publication and, or presentation at peer-reviewed journals and conference proceedings.

## C. CONCLUSION AND RECOMMENDATIONS

1. **RQ # 1. How could a community of practice enable knowledge sharing, as an aspect of knowledge management, in the FTS-IT community (FTS-IT) to mitigate organizational memory loss?**

- a. *Conclusion*

There is a wealth of knowledge accumulated by the HR-IT and the FTS-IT throughout the years. This knowledge is unique because, on the one hand, it relates to IT and IS concepts, and on the other hand, it relates to needed extensive understanding of a



digitized HR information system, KM, project management, and knowledge of mobilizing massive reserve force. To mitigate the organizational memory loss of this invaluable knowledge, the FTS-IT CoP should mitigate the loss of this memory. Knowledge is accumulated in a dynamic and systematic methodology through constant interaction between the community members (Casey, & Olivera, 2011; Corbett, 2000). Therefore, the success of the implementation of an FTS-IT CoP needs full participation from the members to ensure the currency of the knowledge. Moreover, as the literature indicated, the community leaders should champion the CoP and ensure that the community meets the overall strategic objectives, the NAVRESFORCOM, and the USN.

Mentorship is an invaluable means of collaboration and transfers tacit knowledge between the members of the community; Housel and Bell (2001) presented a case of the practice of KM of PLS-Consult; the latter is a Danish company that used mentorship as the means of facilitating the transfer of knowledge among the members assigned to large projects.

#### ***b. Recommendations***

The offices of the NAVRESFORCOM CIO and the CTO are the overall leaders of the community. The model in this study includes a dedicated virtual outlet to convey their messages to the FTS-IT community. Although there is a great value in the codified explicit knowledge, mentorship is a crucial knowledge conveyance methodology. Mentorship generates trust in the community and alleviates ambiguity or misinterpretation of knowledge. Build an e-library with practical guides that help the community members to reenergize the knowledge base and ensure its currency with technology and projects. Add a library of lessons learned from different projects and evolutions.

### **2. RQ #2. How could a focused Community of Practice framework enable learning in the FTS-IT?**

#### ***a. Conclusion***

Based on the interviews, many of the FTS-IT officers suggested that they had minimum knowledge about IT in DOD when they entered the community. Some participants explained their struggle with selecting a learning methodology and IT or IS

education programs. Furthermore, two participants voiced their concerns on how their time pursuing graduate education in IT will be perceived and evaluated for promotion purposes. Hoadley and Kilner (2005) highlighted the importance of learning as a method to help the community members better understand the new organization; this common learning promotes communication between the members; therefore, they move towards adopting common practices.

Graduate education, especially an NPS tour, is important for the highly technical and specialized community; many non-FTS-IT participants showed notable confidence that their tour at NPS will be deemed favorable and within the expected career pipeline. The official literature showed that one way to obtain the IT NOBC is through attending graduate degrees, such as the NWOT curriculum at NPS.

***b. Recommendation***

Recruit more junior FTS-IT officers and send them to NPS at their junior grades to build a strong foundation from an early stage in their career. A clear expectation of IT education should be specified to the community members. Although graduate education through civilian higher education institutes is valuable to the officers' academic knowledge, the curriculum of NWOT connects between best practices in the private sector and the DOD methodologies and process. Additionally, the graduate studies at NPS give the IT officers the opportunity to conduct research in areas that can benefit USN and DOD.

**3. RQ #3. How could a Community of Practice framework enable training and collaboration in the FTS-IT?**

***a. Conclusion***

The FTS-IT does not have an initial training; FTS-IT members are expected to perform IT tasks upon assignments to their posts. The lack of initial training added a significant burden on the FTS-IT members who were expected to search for answers while being trained while performing their job. Furthermore, some senior participants expressed the need for additional project management training and certifications due to increased task load and complexity levels. As indicated earlier, the community's knowledge and its organizational memory face decay over time; this decay will take place although the

knowledge is still relevant and current. However, if the community does not have the means of knowledge sharing, collaboration, and preservation, knowledge eventually disappears from the organizational memory; therefore, the members have to *reinvent the wheel* every time they deal with issues. Casey and Olivera (2011) suggested, training, among other activities, can preserve the community's knowledge from decaying over time.

***b. Recommendation***

The FTS-IT CoP should formulate an initial training program. The current IP community training, in its entirety, might not be the best fit for FTS-IT; the IP community tends to focus on cybersecurity, intelligence, and information dominance, while FTS-IT is focused on business process, HR information systems, and project management. However, some of the IP community's initial training might be relevant and useful for the FTS-IT. The FTS-IT should host periodical training through asynchronous methodologies, such as the community's Sakai LMS or other synchronous delivery, such as MS Teams.

**4. RQ #4. What is an implementation plan for FTS-IT CoP?**

***a. Conclusion***

All participants agreed during the interviews that a CoP will be a beneficial platform for the FTS-IT community. Senior officers showed interest in participating in the CoP to help other junior officers. To determine a suitable plan and a model for the FTS-IT, the researcher investigated existing models of CoP, other military communities' CoP, and the literature. One of the examples that several FTS-IT members mentioned was the FM model. However, after closely analyzing the FM model, the researcher did not see a resemblance between the FM with the FTS-IT communities. The FM community is a much larger community with more support and resources, while the FTS-IT is a small community with fewer resources.

***b. Recommendation***

Take advantage of technology to build a robust FTS-IT CoP. Currently, the researcher built the foundation for such a platform based on two elements: first, the SharePoint site hosted on the Navy Reserve Homeport site. Second, the researcher built

the foundation for a learning and training site on Sakai LMS hosted on the NPS domain. Participation of members and leadership is the driving force of the community. The CoP members should continue to use this platform for KM, collaboration, career development, mentoring, training, and learning. While it is important for the community to encourage self-efficacy, it is important to create clear baselines and expectations; therefore, a clear communication of the leadership guidance is a key to the community's success. The proposed CoP in this study will help the community engage in collaboration to support the community. In this case study, the researcher presented a model and an implementation plan for a CoP, which should solidify the strength of the FTS-IT community.

#### **D. AREAS FOR FUTURE RESEARCH**

##### **1. Cyber-Workforce Community of Practice Across DOD**

This study is a single case study; the researcher selected a strictly qualitative approach to conduct the analysis. This qualitative study does not claim that the models proposed are created to be a *one-size-fits-all* study, yet the study followed Creswell's (2014) inductive logic process (see Appendix H). While the generalizability of this study was not the goal, concepts and models presented here can be replicated in other communities, as suggested by Creswell (2014). The researcher invites the practitioners and other academic researchers to consider applying the concepts discussed here, for the FTS-IT, to a more comprehensive structure that includes all USN or even DOD Cyber Workforce.

The reason for a future examination of applying the concept of CoP at the DOD level is to embrace the contemporary trends in business process and human resources to moving towards digitized platforms and virtual communications. Therefore, creating a common understanding among DOD cyber workforce will encourage a move towards interoperability and common understanding, and access to training and learning. Moreover, the cyber workforce faces common threats internally from users and externally from other agencies and other nations.

The literature shows that the workforce in the DOD is expected to meet minimum requirements and certification requirements. Therefore, having a comprehensive CoP to all

cyber workforce in DOD will help in aligning training and certification. Moreover, it will become the collective voice of the community.

## **2. IT Billets and Communities' Alignment of The IP Community (180x)**

The researcher recommends further studies to evaluate the consolidation of USN IT roles under the MPT&E. The researcher believes that hosting the IP community with other 180x, such as oceanography, cryptography, and naval intelligence, might not be the best fit for the community's future unless the 180x is considered the arms of the U.S. Naval Intelligence. Nevertheless, the researcher did not conduct an in-depth analysis; therefore, he recommends further investigation to the alignment of the IP community and other tracks that support IT and IS.

According to the Navy Information Dominance Corps Human Capital Strategy 2012–2017 (Information Dominance Corps, 2012), the “Information Dominance Imperatives for Developing the Warfighter [is]—Align manpower and information resources to operations across the surface, subsurface, air, space, and cyberspace domains” (p.4); furthermore, the document also indicated that one of the goals is to “create a Warfighting Culture” (p. 7). Indeed, Information Dominance plays an important role in protecting the USN information technology assets and deploy the kill chain methodology if needed to contain any attacks on the USN resources.

The researcher recommends future studies to investigate whether the IP should be aligned with the IWC or MPT&E. Recently, the MPT&E has been going through a complete overhaul to the Navy personnel systems to overcome a major obstacle of a large number of obsolete legacy systems (Metzger, 2015; U.S. Government Accountability Office [GAO], 2019). The current USN, among other DOD, information systems are suffering from the lack of a “standard way to evaluate the performance of HR providers in terms of costs, quality, or other metrics” (U.S. DOD Chief Management Officer [CMO], 2019, p. 19). Therefore, there is a dire need for a robust USN IT workforce skillful in interoperability, virtual domains, and data science.

The opposite approach, which some participants brought up during the interviews, implied a move towards aligning USN IT billets under the IP community. Currently, the

IP community is associated with the IWC; therefore, the IP is blended with cryptology, oceanography, and the naval intelligence communities, which may sound like a misfit of the community if we expect IP to govern business platforms. Therefore, the issue that should be researched is whether the current IP community membership will embrace establishing a balance between being a warfighter community and a champion of using modern standards in the enterprise information technology and maintaining robust business practices, especially ashore.

According to the DOD CIO, there is a need to implement a joint-level information environment to realign oversight of business systems (DOD CIO Memorandum, 2013). This alignment study should look into the enterprise practice of having separate roles of the personnel who manage the information systems and information technology assets on one side and those who oversee cybersecurity and deploy the kill chain methods in case of detected breaches.

### **3. Creation of a Fifth Core Competency of IT and KM for the NHROC**

Figure 4 indicates that currently, the NHROC is founded on four competencies. The researcher suggests investigating the addition of Information Technology and Knowledge Management as a fifth core competency. The researcher invites the NHROC community and other academic researchers to analyze the *value-added* to the USN and DOD mission by adding the IT function as one of the core competencies of the NHROC (see Figure 12). It is not unusual in the USN to see a military community with a dedicated track to IT, such as the case of Health Administration Officers who maintain the IT infrastructure of the USN BUMED. Similarly, the NHROC-IT NHROC has special qualities needed to embrace the MPT&E.

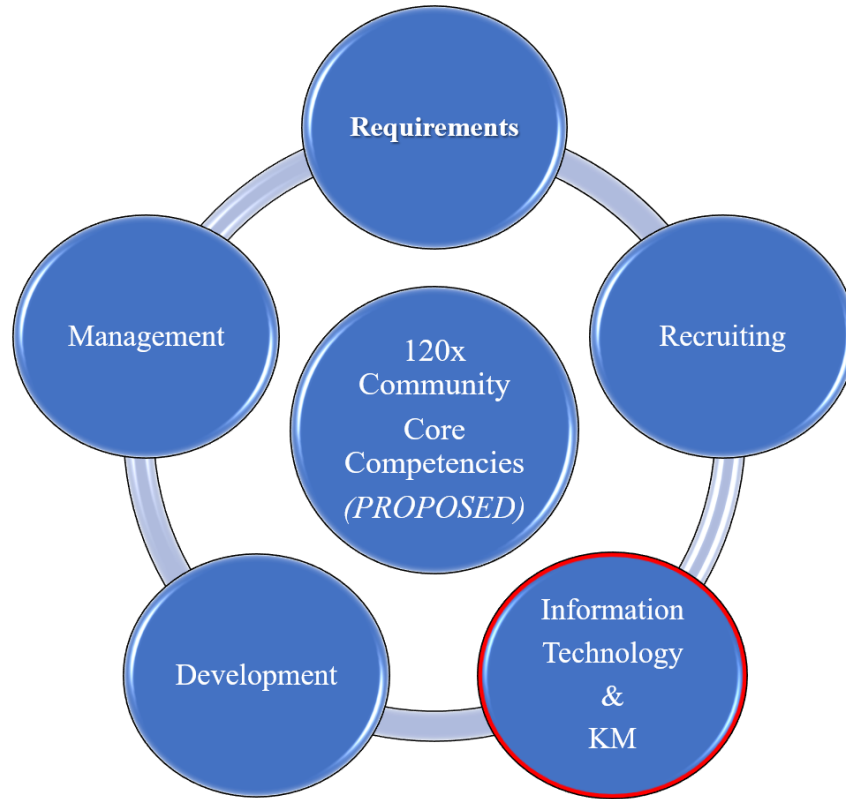


Figure 12. Proposed for further Study: Establishing an Addition (IT/ KM) to the NHROC Core Competencies

## E. CHAPTER SUMMARY

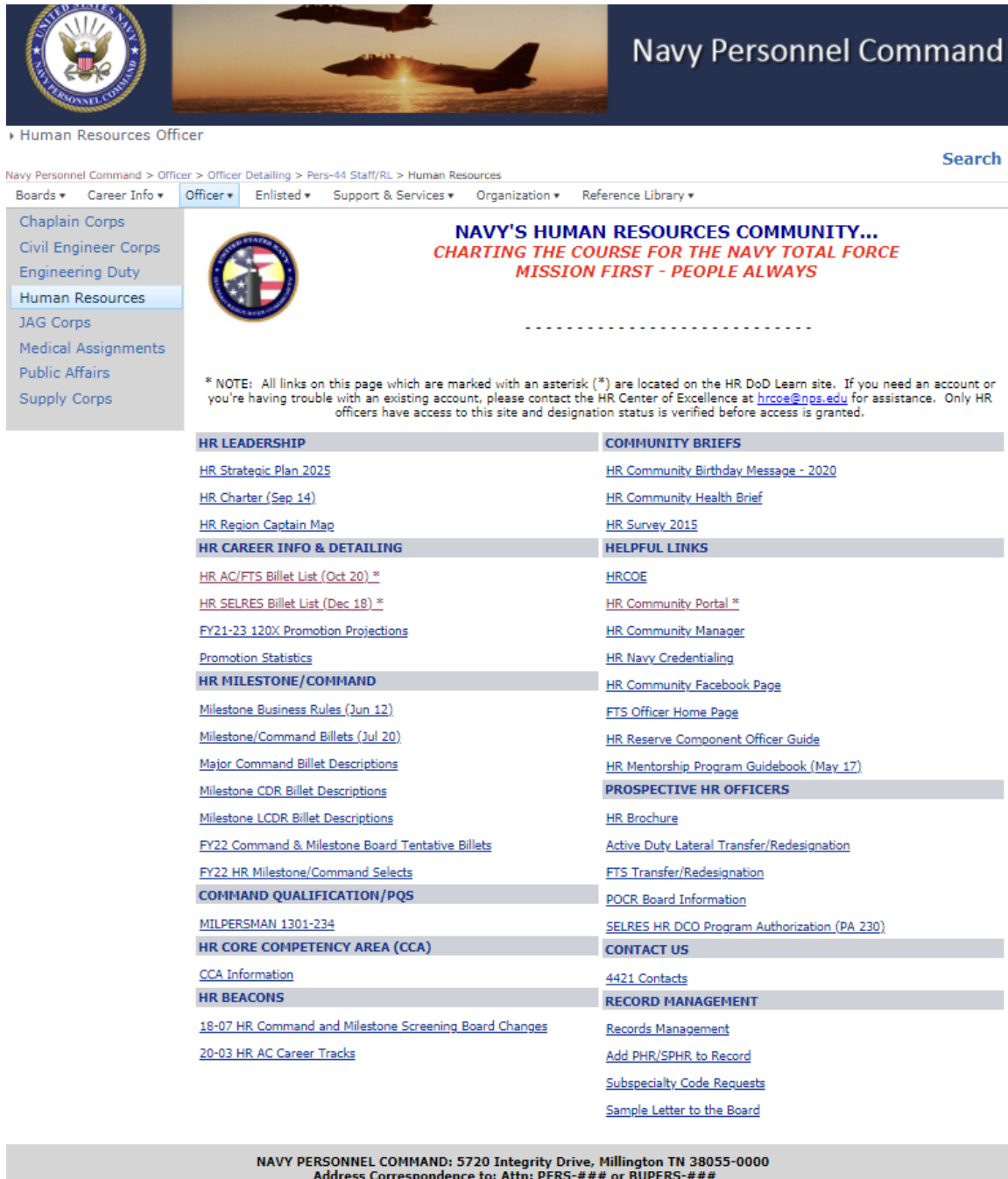
This chapter articulated the summary of the research conducted on the implementation of FTS-IT CoP. In the conclusion and recommendation section, the researcher analyzed the nexus between the research questions, theories, and participants' views. Therefore, he used these elements to present his recommendations for the implementation model of the CoP. These recommendations are encapsulated in the form of two connected technological platforms to embrace collaboration, mentoring, training, learning, and professional development. In this chapter, the researcher also suggested future research on both the academic and the professional levels. He suggested investigating whether to maintain the status of leaving the IP community with other intelligence and information dominance communities or realign the IP community with the MPT&E. Furthermore, with the assumption of establishing an FTS IP community that is

not aligned with the MPT&E, the researcher advocates for maintaining an NHROC-IT track similar to the IT track for the Health Administration Officers' community under BUMED. The current HR officer who serves in an IT track has certification and experience in project management, human resources, and information sciences and information management.



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## APPENDIX A. NAVY HUMAN RESOURCES COMMUNITY MANAGEMENT/ DETAILING SITE ON NPC



**Human Resources Officer**

Search

Navy Personnel Command > Officer > Officer Detailing > Pers-44 Staff/RL > Human Resources

Boards ▼ Career Info ▼ **Officer ▼** Enlisted ▼ Support & Services ▼ Organization ▼ Reference Library ▼

Chaplain Corps  
Civil Engineer Corps  
Engineering Duty  
**Human Resources**  
JAG Corps  
Medical Assignments  
Public Affairs  
Supply Corps

**NAVY'S HUMAN RESOURCES COMMUNITY...**  
**CHARTING THE COURSE FOR THE NAVY TOTAL FORCE**  
**MISSION FIRST - PEOPLE ALWAYS**

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<b>HR LEADERSHIP</b> <a href="#">HR Strategic Plan 2025</a> <a href="#">HR Charter (Sep 14)</a> <a href="#">HR Region Captain Map</a>	<b>COMMUNITY BRIEFS</b> <a href="#">HR Community Birthday Message - 2020</a> <a href="#">HR Community Health Brief</a> <a href="#">HR Survey 2015</a>
<b>HR CAREER INFO &amp; DETAILING</b> <a href="#">HR AC/FTS Billet List (Oct 20) *</a> <a href="#">HR SELRES Billet List (Dec 18) *</a> <a href="#">FY21-23 120X Promotion Projections</a> <a href="#">Promotion Statistics</a>	<b>HELPFUL LINKS</b> <a href="#">HRCOE</a> <a href="#">HR Community Portal *</a> <a href="#">HR Community Manager</a> <a href="#">HR Navy Credentialing</a> <a href="#">HR Community Facebook Page</a> <a href="#">FTS Officer Home Page</a> <a href="#">HR Reserve Component Officer Guide</a> <a href="#">HR Mentorship Program Guidebook (May 17)</a>
<b>HR MILESTONE/COMMAND</b> <a href="#">Milestone Business Rules (Jun 12)</a> <a href="#">Milestone/Command Billets (Jul 20)</a> <a href="#">Major Command Billet Descriptions</a> <a href="#">Milestone CDR Billet Descriptions</a> <a href="#">Milestone LCDR Billet Descriptions</a> <a href="#">FY22 Command &amp; Milestone Board Tentative Billets</a> <a href="#">FY22 HR Milestone/Command Selects</a>	<b>PROSPECTIVE HR OFFICERS</b> <a href="#">HR Brochure</a> <a href="#">Active Duty Lateral Transfer/Redesignation</a> <a href="#">FTS Transfer/Redesignation</a> <a href="#">POCR Board Information</a> <a href="#">SELRES HR DCO Program Authorization (PA 230)</a>
<b>COMMAND QUALIFICATION/PQS</b> <a href="#">MILPERSMAN 1301-234</a>	<b>CONTACT US</b> <a href="#">4421 Contacts</a>
<b>HR CORE COMPETENCY AREA (CCA)</b> <a href="#">CCA Information</a>	<b>RECORD MANAGEMENT</b> <a href="#">Records Management</a> <a href="#">Add PHR/SPHR to Record</a> <a href="#">Subspecialty Code Requests</a> <a href="#">Sample Letter to the Board</a>
<b>HR BEACONS</b> <a href="#">18-07 HR Command and Milestone Screening Board Changes</a> <a href="#">20-03 HR AC Career Tracks</a>	

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Figure 13. NHROC Detailing and Community Management Hosted on the NPC Pages. Source: NPC (n.d.).

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## APPENDIX B. NAVY HUMAN RESOURCES CENTER OF EXCELLENCE (HRCOE) HOSTED ON SAKAI SITE ON NPS.EDU



Figure 14. The NHROC is Hosted by the Human Resources Center of Excellence (HRCOE) on the Sakai LMS. Source: HRCOE (n.d.).

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## APPENDIX C. INFORMATION WARFARE COMMUNITY

Source of the tables in this appendix is Navy Personnel Command [NPC]. Navy Officer Manpower and Personnel Classifications, VOL 1. (pages 167–179). <https://www.mynavyhr.navy.mil/Portals/55/Reference/NOOCS/Vol1/Entire%20Manual%20I%2073.pdf?ver=rpCPz8Vt4b52x7ETh2GP8A%3d%3d>

### INFORMATION WARFARE COMMUNITY First Character: G

These AQD codes are assigned to officers by PERS-4.

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA  Officer will be awarded this AQD if member has:	BILLET DETAILING PREREQUISITES  If other than "N/A", then there are existing billet requirements coded in TFMMS.	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GA1	G	A	Information Professional	1	Basic Qualification	Successfully completed the IP Basic PQS.  <u>Designators:</u> 182X, 618X, 629X, 682X, 782X <u>Grades:</u> W2 to O8 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GA2	G	A	Information Professional	2	Intermediate Qualification	Successfully completed the IP Intermediate qualification.  <u>Designators:</u> 182X, 618X, 629X, 682X, 782X <u>Grades:</u> W2 to O8 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GA3	G	A	Information Professional	3	Advanced Qualification	Successfully completed the IP Advanced qualification.  <u>Designators:</u> 182X, 618X, 629X, 682X <u>Grades:</u> O4 to O8 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA  Officer will be awarded this AQD if member has:	BILLET DETAILING PREREQUISITES  If other than "N/A", then there are existing billet requirements coded in TFMMS.	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GA5	G	A	Information Warfare	5	Strike Group Staff Tactical Action Officer (SGSTAO)	Been designated as Strike Group Staff Tactical Action Officer (SGSTAO) for Strike Group Operations.  <u>Designators:</u> 18XX, 618X, 629X, 682X, 782X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GA6	G	A	Information Professional	6	Knowledge Management Officer (KM)	(a) Successfully completed a Knowledge Management (KM) formal certification program. OR (b) Has served as a primary duty Knowledge Manager for a period of at least 12 months.  <u>Designators:</u> 182X, 618X, 629X, 682X, 782X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA  Officer will be awarded this AQD if member has:	BILLET DETAILING PREREQUISITES  If other than "N/A", then there are existing billet requirements coded in TFMMS.	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GA7	G	A	Information Warfare	7	Information Assurance Officer (IA)	(a) Successfully completed an Information Assurance (IA) formal certification program. OR (b) Has served as a primary duty Information Assurance Officer for a period of at least 12 months.  <u>Designators:</u> 18XX, 618X, 629X, 68XX, 78XX <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GA8	G	A	Information Warfare	8	Chief Information Officer (CIO)	(a) Successfully completed a Chief Information Officer (CIO) formal certification program. OR (b) Has served as a primary duty Chief Information Officer for a period of at least 12 months.  <u>Designators:</u> 18XX, 618X, 629X, 68XX, 78XX <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA  Officer will be awarded this AQD if member has:	BILLET DETAILING PREREQUISITES  If other than "N/A", then there are existing billet requirements coded in TFMMS.	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GA9	G	A	Information Warfare	9	Individual Augmentee	Been assigned overseas in an Individual Augmentee (IA), Global Support Assignment (GSA), or Contingency TAD Operations status in a C4 billet for a period of at least 6 months.  <u>Designators:</u> 18XX, 618X, 629X, 68XX, 78XX <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GB1	G	B	Milestone	1	LCDR	Successfully completed an O4 milestone tour.  <u>Designators:</u> 18XX, 618X, 629X <u>Grade:</u> O4 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GB2	G	B	Milestone	2	CDR	Successfully completed an O5 milestone tour.  <u>Designators:</u> 18XX, 618X, 629X <u>Grade:</u> O5 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA  Officer will be awarded this AQD if member has:	BILLET DETAILING PREREQUISITES  If other than "N/A", then there are existing billet requirements coded in TFMMS.	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GB3	G	B	Milestone	3	CAPT	Successfully completed an O6 milestone tour.  <u>Designators:</u> 18XX, 618X, 629X <u>Grade:</u> O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31 PERS-47
GC0	G	C	Information Warfare Community (IWC) Qualification Program	0	Information Warfare	Successfully completed the IWC Personnel Qualification Standard (PQS).  <u>Designators:</u> 144X Information Warfare Engineering Duty Officer (IWEDO) mentor group, 18XX, 618X, 628X, 629X, 68XX, 718X, 78XX, Space Cadre <u>Grades:</u> All <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31, PERS-47
GC1	G	C	Information Warfare Community Qualification Program	1	Information Warfare Officer Intermediate Course	Successfully completed the Information Warfare Officer Intermediate Course (CIN: J-3A-1200)  <u>Designators:</u> 18XX, 68XX, 78XX <u>Grades:</u> All <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> OPNAV N2N6  <u>Auxiliary:</u> BUPERS-31, PERS-47



AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GC2	G	C	IWC Qualification Program	2	JFTOC Watch Officer	Successfully completed the Joint Fleet Telecommunications Operations Center (JFTOC) Watch Officer JQR.  <u>Designators:</u> 18XX, 618X, 629X, 68XX, 78XX <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31, PERS-47
GU1	G	U	Undersea Warfare Support	1	TASW Watch Officer	(a) Completed NAVEDTRA 50007 Theater Anti-Submarine Warfare (TASW) PQS sections 301 through 303; AND (b) Completed 6 months in a TASW support billet.  <u>Designators:</u> 18XX, 68XX, 78XX <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NAVIFOR  <u>Auxiliary:</u> BUPERS-31, PERS-4

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW1	G	W	Warfare Tactics Instructor (WTI)	I	Instructor	(a) Earned the GW1 Code OR (b) Earned the GW2 Code OR (c) Earned the GW3 Code OR (d) Earned the GW4 Code OR (e) Earned the GW5 Code OR (f) Earned the GW6 Code AND (g) Completed requirements found within NAVINFOWARDEVCCENINST 1501.1 (series)  Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 5 (Instructor).  <u>Designators:</u> 180X, 181X, 182X, 183X, 184X, 680X, 683X, 780X, 781X, 782X, 783X, 784X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW1	G	W	Warfare Tactics Instructor (WTI)	I	Electronic Warfare (EW)	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>• IW WTI Baseline Course</li><li>• Level 4 EW Core Training</li><li>• Level 4 EW Strand Training</li><li>• IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (EW)  <u>Designators:</u> 181X, 781X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA  Officer will be awarded this AQD if member has:	BILLET DETAILING PREREQUISITES  If other than "N/A", then there are existing billet requirements coded in TFMMS.	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW2	G	W	Warfare Tactics Instructor (WTI)	2	Intelligence Operations (Intel Ops)	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>• IW WTI Baseline Course</li><li>• Level 4 Intel Ops Core Training</li><li>• Level 4 Intel Ops Strand Training</li><li>• IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (Intel Ops)  <u>Designators:</u> 181X, 183X, 781X, 783X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW3	G	W	Warfare Tactics Instructor (WTI)	3	Meteorology / Oceanography (METOC)	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>IW WTI Baseline Course</li><li>Level 4 METOC Core Training</li><li>Level 4 METOC Strand Training</li><li>IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (METOC).  <u>Designators:</u> 180X, 780X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW4	G	W	Warfare Tactics Instructor (WTI)	4	Information Operations (Info Ops)	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>IW WTI Baseline Course</li><li>Level 4 Info Ops Core Training</li><li>Level 4 Info Ops Strand Training</li><li>IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (Info Ops).  <u>Designators:</u> 181X, 781X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW6	G	W	Warfare Tactics Instructor (WTI)	6	Command and Control/Cyber space Operations (C2/CO)	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>• IW WTI Baseline Course</li><li>• Level 4 C2/CO Core Training</li><li>• Level 4 C2/CO Strand Training</li><li>• IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (C2/CO).  <u>Designators:</u> 181X, 182X, 184X, 781X, 782X, 784X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW5	G	W	Warfare Tactics Instructor (WTI)	5	Space	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>IW WTI Baseline Course</li><li>Level 4 Info Space Core Training</li><li>Level 4 Info Space Strand Training</li><li>IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (Space).  <u>Designators:</u> 180X, 181X, 182X, 183X, 680X, 683X, 780X, 781X, 782X, 783X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

AQD CODE	CHARACTER					OFFICER AWARDING CRITERIA	BILLET DETAILING PREREQUISITES	CONSULTANTS
	1ST	2ND		3RD				
		CODE	TITLE	CODE	TITLE			
GW6	G	W	Warfare Tactics Instructor (WTI)	6	Command and Control/Cyber space Operations (C2/CO)	Successfully completed the Information Warfare (IW) WTI pipeline which includes the following courses: <ul style="list-style-type: none"><li>IW WTI Baseline Course</li><li>Level 4 C2/CO Core Training</li><li>Level 4 C2/CO Strand Training</li><li>IW WTI Presentation/Board</li></ul> Note: Must be designated in writing by Commander, Naval Information Warfighting Development Center as a Warfare Tactics Instructor (WTI) Level 4 (C2/CO).  <u>Designators:</u> 181X, 182X, 184X, 781X, 782X, 784X <u>Grades:</u> W2 to O6 <u>Length of Validity:</u> Indefinite <u>Manpower Type:</u> Active and Reserve	N/A	<u>Primary:</u> NIWDC  <u>Auxiliary:</u> NAVIFOR BUPERS-31 PERS-47 OPNAV N2N6

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## APPENDIX D. THE REQUIREMENTS FOR THE CYBER WORKFORCE (IA WORKFORCE)

The Source of the table in this appendix is DOD 8570.01-M, 2015, ap3.APPENDIX 3.

	<b>IAT I-III</b>	<b>IAM I-III</b>	<b>IASAE I-III</b>	<b>CND-A, CND-IS, CND-IR, CND-AU and CND-SPM</b>
Initial Training	Yes*	Yes**	Yes**	Yes*
IA Baseline Certification (from approved list)	Yes (IA Certification) (within 6 months)	Yes (IA Certification) (within 6 months)	Yes (IA Certification) (within 6 months)	Yes (CND Certification) (within 6 months)
Initial OJT Evaluation	Yes (for initial position)	No	No	Yes (except CND-SPM)
CE/OS Certificate	Yes	No	No	Yes (except CND-SPM)
Maintain Certification Status	Yes (as required by certification)	Yes (as required by certification)	Yes (as required by certification)	Yes (as required by certification)
Continuous Education or Sustainment Training	Yes (as required by certification)	Yes (as required by certification)	Yes (as required by certification)	Yes (as required by certification)
Background Investigation	As required by IA level and Reference (c)	As required by IA level and Reference (c)	As required by IA level and Reference (c)	As required by CND-SP level and Reference (c)
Sign Privileged Access Statement	Yes	n/a	n/a	Yes
Experience	IAT I: Normally has 0 to 5 or more years of experience in IA technology or a related field.	IAM I: Usually an entry level management position with 0 to 5 or more years of management experience.	IASAE I: Usually an entry level IASAE position with 0 or more years of IASAE experience.	Recommended years of experience in CND technology or a related field: CND-A: at least 2 CND-IR: at least 5 CND-AU: at least 2
	IAT II: Normally has at least 3 years in IA technology or a related area.  IAT III: Normally has at least seven years of experience in IA technology or a related area.	IAM II: Usually has at least five years of management experience. IAM III: Usually has at least 10 years of management experience.	IASAE II: Usually has at least 5 years of IASAE experience.  IASAE III: Usually has at least 10 years of IASAE experience.	CND-IS: Recommended at least 4 years of experience supporting CND and/or network systems and technology CND-SPM: Recommended at least 4 years of experience in CND management or a related field
*Classroom, distributive, blended, government or commercial provider				

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## APPENDIX E. THE RESEARCH INTERVIEW QUESTIONS

### Interview Questions

The questions are designed to meet two goals: first, the participants' unique population; second, the researcher intends to analyze the research topics. Therefore, the categories of the interviews' questions are:

- i. Common questions for all groups.
- ii. Questions directed to the Junior Members of the Navy Designators 1207/ IT (O1–O4).
- iii. Questions directed to the Senior Members of the Navy Designators 1207/ IT (O5–O6).
- iv. Questions directed to the members of the Navy IP Community (Designators 1820), as established Naval IT community (Comparative Model).

#### i. Common Questions for all groups:

Question	Purpose, Topic, and/or RQ
1. Rank	- Demographic - For record
2. Gender	- Demographic - For record
3. Do you feel that there should differences in the standards of the cyber-workforce in Active, FTS, and Reserve components?	- General - RQ 1
4. What should be the priorities of the Cyber workforce in maintaining the Navy Systems?	- General - RQ 1
5. <i>Follow-up question</i> : would your answer change for the Navy Reserve and FTS components?	- General - RQ 1



## ii. Junior Members of the Navy Designators 1207/ IT

Question	Purpose, Topic, and/or RQ
1. How long have you been a member of the 1207-IT (or FTS-IT) track?	- CoP: Org. Membership
2. What motivated you to join the 1207-IT (or FTS-IT) track?	- CoP: Org. Membership
3. Before joining the 1207-IT (or FTS-IT) track, had you considered other communities?	- CoP: Org. Membership
4. How would you describe the career of the 1207-IT (or FTS-IT) officer? For example, can you elaborate on the career milestones, progression, assignments, etc.?  <i><u>NOTE:</u> This question pertains to the community, not the participant's own career milestones and progression.</i>	- CoP: Org. Membership - RQ 1 - RQ 4
5. How do you find out about billets available? What is the usual process of assigning 1207-IT (or FTS-IT)?	- CoP: Org. Membership - IT Talent Management - RQ 1 - RQ 4
6. Where and how do you learn about the expectations of these requirements?	- CoP: Org. Membership - RQ 4
7. How many mentors do you have? And how often do you meet with your mentor(s)?	- CoP: Org. Membership - CoP: Community Coordination - IT Talent Management - Mentorship - RQ 1 - RQ 4
8. Follow-up question for question #6: Is your mentor(s) member(s) of the 1207-IT (or FTS-IT)?	- CoP: Org. Membership - CoP: Community Coordination - IT Talent Management - Mentorship - RQ 1 - RQ 4

Question	Purpose, Topic, and/or RQ
9. Do you have an undergraduate level degree, or did you have at least 20 credit hours at the college level in one of the following areas: IT, IT, Cybersecurity, or other related fields before joining the 1207-IT (or FTS-IT)?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 2</li> <li>- RQ3</li> <li>- RQ 4</li> </ul>
10. <i>If No</i> ; Did you obtain an undergraduate level degree in the fields in question# 9?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 2</li> <li>- RQ3</li> <li>- RQ 4</li> </ul>
11. Do you have a graduate-level degree in the following areas: IT, IS, Cybersecurity, or other related fields before joining the 1207-IT (or FTS-IT)?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 2</li> <li>- RQ3</li> <li>- RQ 4</li> </ul>
12. <i>If No</i> ; Did you obtain a graduate-level degree in the fields in question# 10?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 2</li> <li>- RQ3</li> <li>- RQ 4</li> </ul>

Question	Purpose, Topic, and/or RQ
13. Since you joined the 1207-IT (or FTS-IT), what type of training and career development have you received?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- CoP: Community Engagement</li> <li>- IT Talent Management</li> <li>- RQ 3</li> <li>- RQ 4</li> </ul>
14. In relation to other cyber workforce communities in the Department of the Navy, do you feel the 1207-IT (or FTS-IT) can assume similar tasks to these communities? Why?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- RQ 1</li> <li>- RQ 4</li> </ul>
15. How would you describe the group dynamics, collaboration, and interaction among the 1207-IT (or FTS-IT)?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- Knowledge Management</li> <li>- IT Talent Management</li> <li>- RQ 1</li> <li>- RQ 4</li> </ul>
16. What type of activities do you and your fellow 1207-IT (or FTS-IT) members share as a community (this includes social, sports activities, an annual gathering, etc.)?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- Social engagement</li> <li>- RQ 4</li> </ul>
17. Do you know how to locate available IT billets? What do you think your chances are that the next three billets will be in the IT field? Why?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- RQ 4</li> </ul>
18. Are you familiar with the concept of CoP?	Prep. Question.

Question	Purpose, Topic, and/or RQ
18.a if yes → How would a CoP help the 1207-IT (or FTS-IT) members?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- Social engagement</li> <li>- RQ 1</li> <li>- RQ 2</li> <li>- RQ3</li> <li>- RQ 4</li> </ul>
18.b If no → I will explain the elements of CoP, then ask question 18.a	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- Social engagement</li> <li>- RQ 2</li> <li>- RQ3</li> <li>- RQ 4</li> </ul>

**iii. Senior Members of the Navy Designator 1207 other NAVRESFORCOM Leadership**

Question	Purpose, Topic, and/or RQ
1. How long have you been a member of the 1207-IT (or FTS-IT) track?	CoP: Org. Membership
2. What challenges did you have in the past that do not exist now for the 1207-IT (or FTS-IT)?	CoP: Org. Membership Community History
3. Would you say that the challenges facing the 1207-IT (or FTS-IT) community have evolved?	CoP: Org. Membership Community History
4. In relation to other cyber workforce communities in the Department of the Navy, do you feel the 1207-IT (or FTS-IT) can assume similar tasks to these communities? Why?	CoP: Org. Membership CoP: Community Coordination CoP: Learning and Training IT Talent Management RQ 1 RQ 2 RQ3 RQ 4
5. Several organizations adopt the CoP concept in the private and public sectors to infuse a sense of community, knowledge management, and members' development. Do you feel that a CoP can help the 1207-IT (or FTS-IT) members?	CoP: Org. Membership CoP: Community Coordination CoP: Learning and Training IT Talent Management Community Leadership RQ 1 RQ 2 RQ3 RQ 4

iv. **Members of other Navy IT Designators/Subspecialties (Comparison Model)**

Question	Purpose, Topic, and/or RQ
1. How long have you been a member of 1820?	- CoP: Org. Membership
2. What motivated you to join 1820?	- CoP: Org. Membership
3. Before joining 1820, had you considered other communities?	- CoP: Org. Membership
4. Is there initial training and continuous training required from the 1820 community? Where and how do you learn about the expectation of these requirements?	- CoP: Org. Membership - RQ 1 - RQ 2 - RQ 3 - RQ 4
5. How would you describe the career of an 1820 officer? For example, can you elaborate on the career milestones, progression, assignments, etc.?  <i><u>NOTE:</u> This question pertains to the community, not the participant's own career milestones and progression.</i>	- CoP: Org. Membership - RQ 1 - RQ 4
6. How do you find out about billets available? What is the usual process of assigning 1820?	- CoP: Org. Membership - IT Talent Management - RQ 1 - RQ 4
7. How many mentors do you have? And how often do you meet with your mentor(s)?	- CoP: Org. Membership - CoP: Community Coordination - IT Talent Management - Mentorship - RQ 1 - RQ 4
8. Follow-up question for question #6: Is your mentor(s) member(s) of the 1820?	- CoP: Org. Membership - CoP: Community Coordination - IT Talent Management - Mentorship - RQ 1 - RQ 4

Question	Purpose, Topic, and/or RQ
9. Do you have an undergraduate level degree, or did you have at least 20 credit hours at the college level in one of the following areas: IT, IS, Cybersecurity, or other related fields before joining the 1820 community?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 1</li> <li>- RQ 2</li> <li>- RQ 4</li> </ul>
10. <i>If No</i> ; Did you obtain an undergraduate level degree in the fields in question# 8?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 1</li> <li>- RQ 2</li> <li>- RQ 4</li> </ul>
11. Do you have a graduate-level degree in the following areas: IT, IS, Cybersecurity, or other related fields before joining the IT field (Cyberworkforce)?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 1</li> <li>- RQ 2</li> <li>- RQ 4</li> </ul>
12. <i>If No</i> ; Did you obtain a graduate-level degree in the fields in question# 10?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- Learning</li> <li>- RQ 1</li> <li>- RQ 2</li> <li>- RQ 4</li> </ul>

Question	Purpose, Topic, and/or RQ
13. Since you joined 1820 (or similar navy subspeciality), what type of training and career development have you received?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- CoP: Community Engagement</li> <li>- RQ 3</li> </ul>
14. Concerning other cyber workforce communities in the Department of the Navy, do you feel 1820 can assume similar tasks to these communities? Why?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: Learning and Training</li> <li>- IT Talent Management</li> <li>- RQ 1</li> </ul>
15. How would you describe the group dynamics, collaboration, and interaction among 1820?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- Knowledge Management</li> <li>- IT Talent Management</li> <li>- RQ 1</li> <li>- RQ 4</li> </ul>
16. What type of activities do you and your fellow 1820 community members share as a community (this includes social, sports activities, an annual gathering, etc.)?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- Social engagement</li> <li>- RQ 4</li> </ul>
17. Do you know how to locate available IT billets? What do you think your chances are that the next three billets will be in the IT field? Why?	<ul style="list-style-type: none"> <li>- CoP: Org. Membership</li> <li>- CoP: Community Coordination</li> <li>- CoP: self-efficacy</li> <li>- RQ 1</li> <li>- RQ 4</li> </ul>
18. Do you have a knowledge base available for the IP community?	<ul style="list-style-type: none"> <li>- Knowledge Management</li> <li>- RQ 1</li> <li>- RQ 4</li> </ul>



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## APPENDIX F. PARTICIPANTS RECRUITMENT EMAIL

### Recruitment script

Hello, my name is \_\_\_\_\_ I am a graduate student at the Naval Postgraduate School the Information Science Department. I am conducting research on establishing a community of knowledge in the Navy FTS 1207-IT community.

Participation in this research includes interviews about your views about the IT community development, training, and milestones in general. Unless you share your own career milestone to give examples, there is no questions will pertain to your career milestones. The interviews will take approximately 30 to 45 minutes.

The interviews will take place via MS Teams or Zoom. If not possible, then I can contact you via phone.

*(NOTE: for participants who are on NPS campus: We can meet on campus at NPS while maintaining social distance requirement).*

If you have any questions or would like to participate in the research, I can be reached at AYMAN.MOTTALEB@NPS.EDU

Thank you in advance for accepting to meet with me and participate in this research. I know your time is valuable and I truly appreciate it.

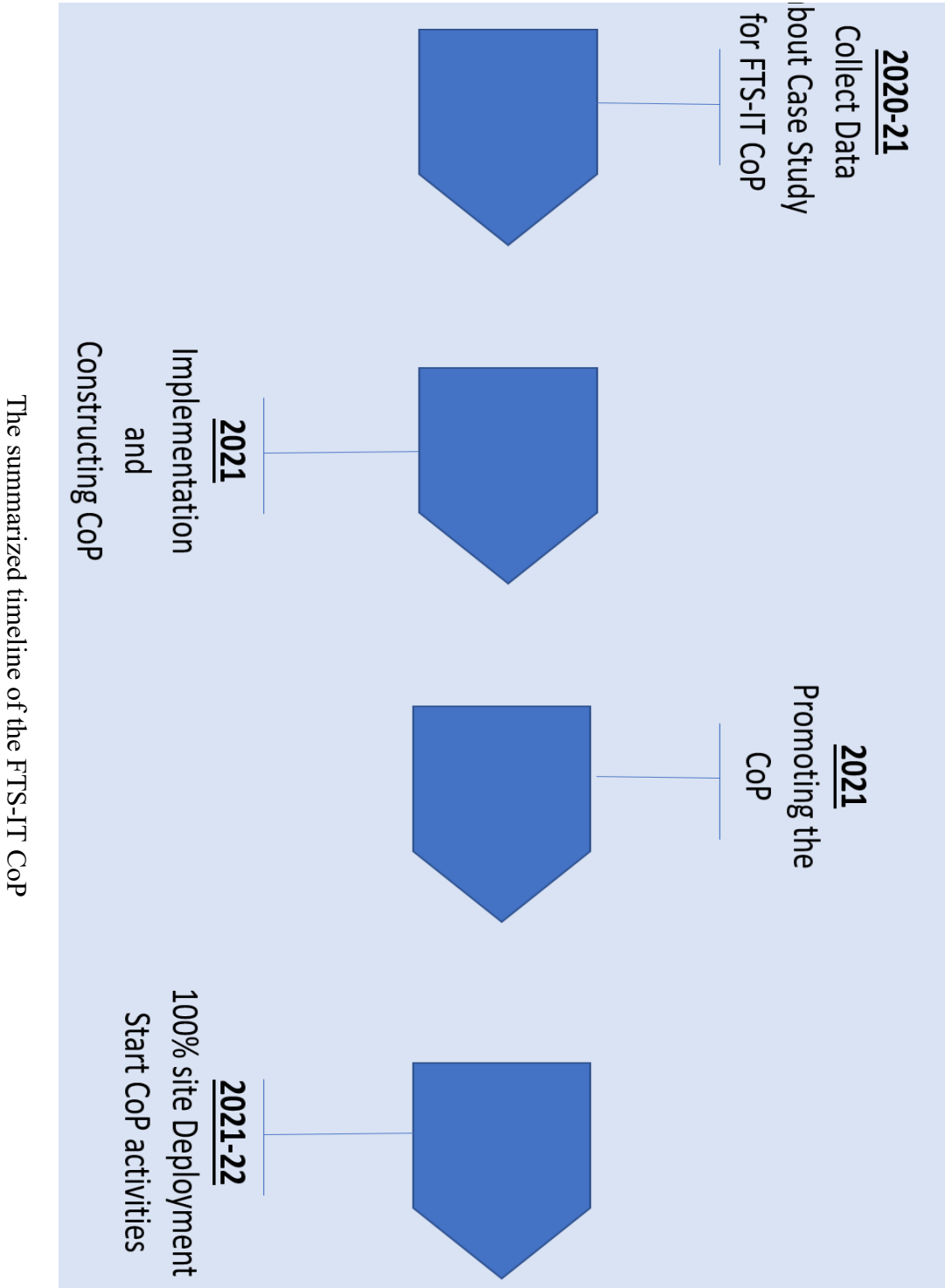
V/R

Ayman Mottaleb, LCDR, USN

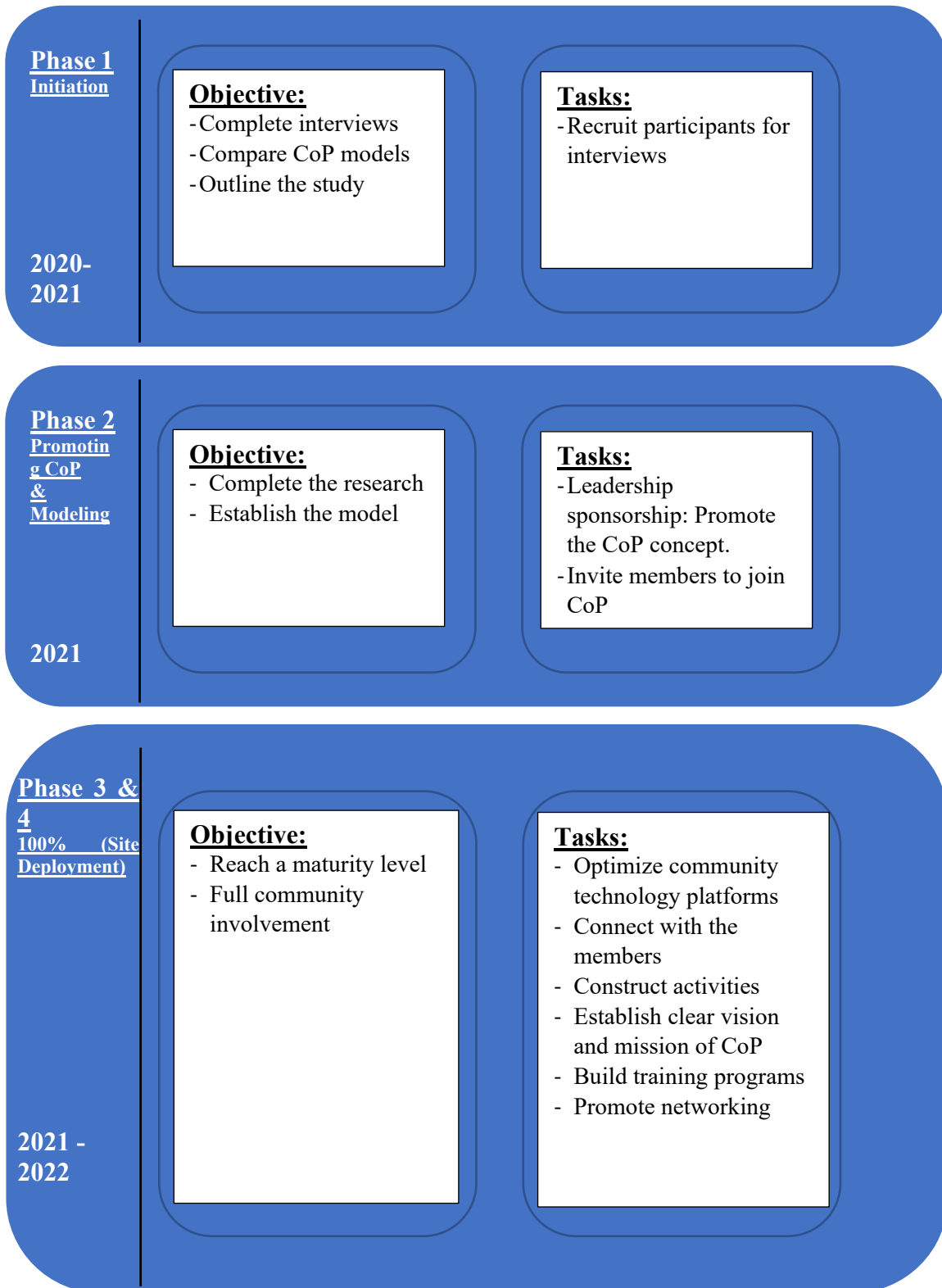
MSc (Candidate) Information Sciences

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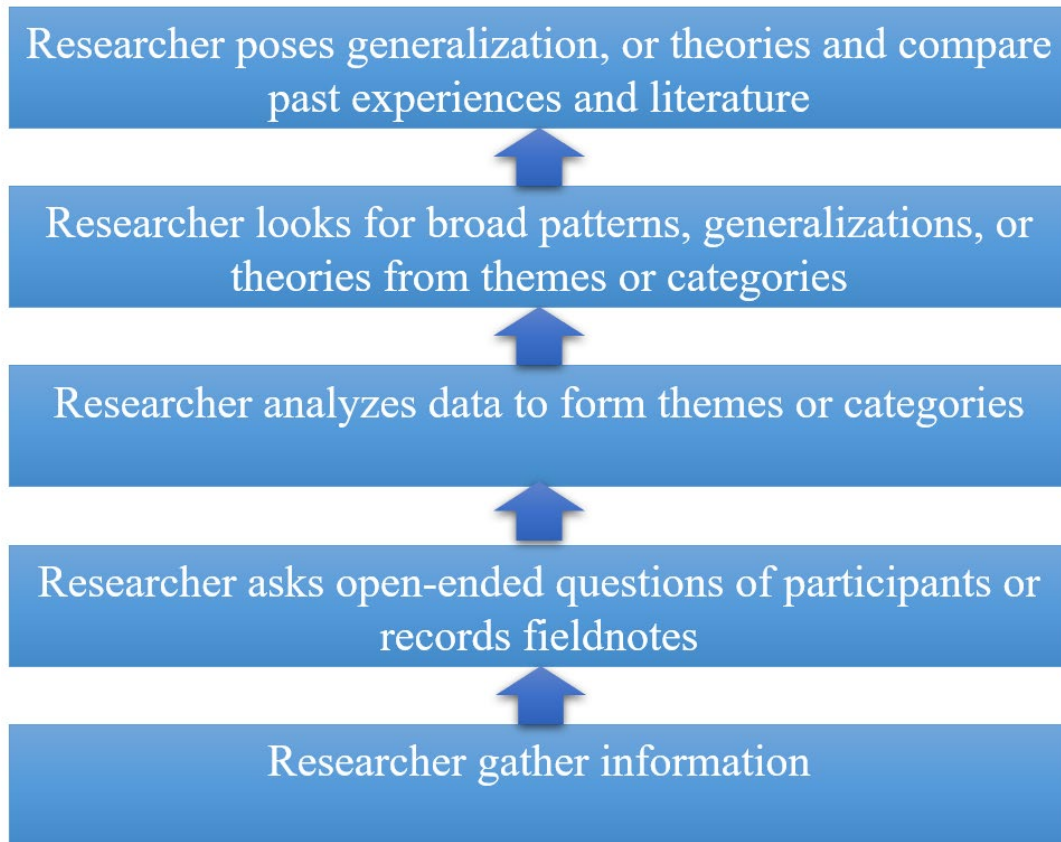
APPENDIX G. THE CoP IMPLEMENTATION PLAN



## THE COP IMPLEMENTATION PLAN: DETAILED PHASES AND TASKS



## APPENDIX H. CRESWELL INDUCTIVE LOGIC



“The Inductive Logic of Research in a Qualitative Study”  
Source: Creswell (2014, p. 66).

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